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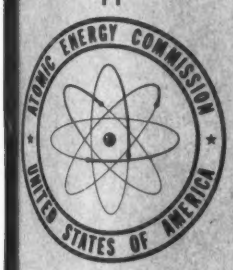

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NUCLEAR SCIENCE ABSTRACTS

Volume 10 November 15, 1956 No. 21 Suppl.

GENERAL

ATOMIC POWER

Refer to abstract 10940.

BIOLOGY AND MEDICINE

RADIATION HAZARDS AND PROTECTION

10696 HW-28065
[Hanford Atomic Products Operation, Richland, Wash.]
A STUDY OF EFFICIENCIES AND PRESSURE DROP CHARACTERISTICS OF AIR-FILTERING MEDIA. F. E. Adley, R. H. Scott, and W. E. Gill. Aug. 10, 1953. Changed from OFFICIAL USE ONLY July 6, 1956. 21p. Contract [W-31-109-Eng-52]. $4.80(ph OTS); $2.70(mf OTS).

Removal of particles from air is discussed in terms of three classes of filtering media — air-sampling, respirator, and air-cleaning. Of eleven filters having actual or possible application at Hanford Atomic Products Operation, seven have uses in air-sampling, four in respirators, and four in air-cleaning. Their efficiencies in filtration were tested with a fume of U_3O_8 having a median particle size, by count, of 0.07 microns. Plots of efficiency versus filtering velocity are presented. The pressure drop characteristics of the filters are discussed in terms of initial pressure drops of the clean filters, variations in pressure drop of the individual filters, and comparison of loading rates. In a range of filtering velocities from 14 to 180 feet per minute, filters for air-sampling varied from 28% to 99%, for respirators from 71% to 97%, and for air-cleaning from 96% to 99.9% efficient. Among the more efficient filters, efficiency tended to decrease with increasing velocity. Initial pressure drops of these filters ranged from 0.04 to 3.0 inches of water at 14 feet per minute and from 0.5 to 38 inches at 180 feet per minute. A three-fold increase in the original pressure drops resulted from fume loads varying from 11 milligram per square foot for low-capacity filters to 2800 for high-capacity filters. (auth)

10697 HW-32292
Hanford Atomic Products Operation, Richland, Wash.
AN APPLICATION OF FLUORESCENT PIGMENT TO THE MEASUREMENT OF PARTICLE INHALATION PROBABILITIES. L. C. Schwendiman. July 1, 1954. Changed from OFFICIAL USE ONLY July 6, 1956. 18p. Contract W-31-109-Eng-52. $3.30(ph OTS); $2.40(mf OTS).

Zinc sulfide powder with a median diameter of about two μ was used to determine the probability of a single radioactive particle being transferred to the air and breathed in several operations involving operation and maintenance of sedans and busses. A known number of particles were deposited with soil normally present, then the operation giving rise to a potential exposure performed. The number of ZnS particles found on respirators worn or collected on filters used to sample the air during the operation was determined using a microscope and ultraviolet illumination. The probability of breathing a single particle when present was found to range from 6×10^{-7} per hour for driving with minimum air turbulence in the vehicle, to 6×10^{-4} per hour for sweeping the dirt from a bus. Other operations and probabilities are discussed. (auth)

CHEMISTRY

10698 CF-52-3-143
[Oak Ridge National Lab., Tenn.]
THERMAL DECOMPOSITION OF NITROUS OXIDE. Stanley H. Jury. Feb. 22, 1952. 16p. Contract [W-7405-eng-26]. $3.30(ph OTS); $2.40(mf OTS).

The thermal decomposition of N_2O in a flow reactor has been investigated thermodynamically. The following reactions are involved. (1) $2N_2O = 2NO + N_2$, (2) $2N_2O = 2N_2 + O_2$, and (3) $2NO + O_2 = 2NO_2$. Equilibrium constants have been plotted. (W.L.H.)

10699 KAPL-722
Knolls Atomic Power Lab., Schenectady, N. Y.
STATIC PRESSURE DUE TO SODIUM–WATER REACTIONS IN CLOSED VESSELS. W. S. Horton. Mar. 26, 1952. Decl. Dec. 7, 1955. 20p. Contract W-31-109-Eng-52. $0.20(OTS).

The reaction between H_2O and Na, followed by reaction of the liberated H_2 with air, in a closed vessel is treated as a thermodynamic problem at constant volume. The results for reaction of stoichiometrically equivalent amounts of Na and H_2O for varying size of vessel are found to follow the equation: $P = 3.44 + 45.64\ R - 7.97\ R^2$ where P is the final pressure in pounds per square inch gauge, and R is the ratio of Na (in hundreds of cubic feet measured at 350°F) to dry air (in millions of cubic feet at 77°F). This equation is satisfactory when the final temperature is above the melting point of NaOH (591°K). (auth)

10700 KAPL-M-SMS-3
Knolls Atomic Power Lab., Schenectady, N. Y.
BASIC SUB-COOLED LIGHT WATER PROPERTIES. Apr. 18, 1955. 14p. Contract W-31-109-Eng-52. $3.30 (ph OTS); $2.40(mf OTS).

Data on the specific heat, density, dynamic viscosity, vapor pressure, thermal conductivity, surface tension, enthalpy, and entropy of H_2O are tabulated. (B.J.H.)

10701 KAPL-M-WHH-3
Knolls Atomic Power Lab., Schenectady, N. Y.
REACTION RATE OF SOLID SODIUM WITH AIR. William H. Howland and Leo F. Epstein. Oct. 19, 1953. 11p. Contract W-31-109-eng-52. $3.30(ph OTS); $2.40 (mf OTS).

The rate of reaction of solid Na with air, and the effect of Na purity and temperature on this process were measured. The moisture content of the atmosphere and the temperature of the sample affect the Na–air reaction. Temperatures were maintained at 30, 55, and 80°C but no attempt was made to control humidity which averaged about 30% at room temperature thus the measured reaction rate is the sum of the rate of oxidation and the rate of formation of the hydroxide. (F.S.)

10702 MLM-379-1(Extract)
[Mound Lab., Miamisburg, Ohio.]
THE SOLUBILITY OF TELLURIUM(IV) OXIDE IN

HYDROCHLORIC ACID. THE POTENTIAL OF THE TELLURIUM ELECTRODE IN CHLORIDE SOLUTIONS. J. H. Payne, Jr. [nd]. Decl. Apr. 5, 1956. 28p. $4.80 (ph OTS); $2.70(mf OTS).

The solubility of TeO_2 was measured in the range 0.009 to 6.3 molal HCl at 25°C. A colorimetric method was found for determining Te which is based on the yellow color of Te^{4+} in concentrated HCl. Measurements were made at 375 mμ and gave a sensitivity of about one μg of Te per ml. The potential measurements are in agreement with solubility studies in HCl which show the $Te(OH)_3^+$ complex present at low acid concentrations. At high acid concentrations the complex $TeCl_3^+$ is present. Half-cell potentials have been calculated at 25°C. (W.L.H.)

10703 NYO-5157

Mallinckrodt Chemical Works, St. Louis.

VISCOSITY-TEMPERATURE RELATIONSHIP FOR A 32% $Ca(NO_3)_2$ SOLUTION. A. Grunewald. Jan. 22, 1946. Decl. Oct. 18, 1955. 6p. Contract W-14-108-eng-8. $1.80(ph OTS); $1.80(mf OTS).

An Ostwald viscometer was used to obtain a plot of viscosities of a $Ca(NO_3)_2$ solution between 0 and −20°C. (T.R.H.)

ANALYTICAL PROCEDURES

10704 AECD-3944

Tennessee Eastman Corp., Oak Ridge, Tenn.

TEC-CEW MANUAL OF STANDARD ANALYTICAL METHODS. First Edition, with New Methods and Revisions as of Dec. 1945. Clyde Casto, Norman Exley, Robert H. Smellie, Jr., and T. Duane Price. Oct. 18, 1949. Decl. Dec. 1955. 202p. Contract [W-7405-eng-23.] (CD-3801-Rev.). $1.00(OTS).

10705 AECD-3967

[Carbide and Carbon Chemicals Corp. K-25 Plant, Oak Ridge, Tenn.]

A RAPID COLORIMETRIC METHOD FOR THE DETERMINATION OF FLUORIDE ION USING "FERRISAL" REAGENT. Joseph Greenspan and Sidney J. Stein. Nov. 9, 1944. Decl. Dec. 23, 1955. 13p. (KZ-891). $3.30(ph OTS); $2.40(mf OTS).

A rapid colorimetric method is described for the determination of fluoride ion. The method utilizes the decolorization of ferric−salicylic acid complex by fluoride ion. The present reagent has been adapted to the range: one to 140 micrograms of fluoride per ml of solution. The method may be used in the presence of TO_2^{2+} [UO_2^{2+}] if appropriate corrections are applied. (auth)

10706 CF-53-5-228

Oak Ridge National Lab., Tenn.

ION EXCHANGE SEPARATION OF TRACE IMPURITIES. W. A. Brooksbank and G. W. Leddicotte. May 1, 1953. 18p. Contract [W-7405-eng-26]. $3.30(ph OTS; $2.40 (mf OTS).

The use of ion-exchange separations in deteriming trace elements by neutron activation analysis is described. Activation analysis, coupled with ion-exchange techniques, becomes an extremely sensitive and specific method for the determination of small quantities of the rare earth and alkali elements in the presence of each other. This method has been applied to the analysis of rare earths in animal tissues and to the analysis of the alkali metals in pure chemical compounds and synthetics. (auth)

10707 CF-54-9-16

[Oak Ridge National Lab., Tenn.]

INVESTIGATION OF VACUUM FUSION AND OTHER EQUIPMENT FOR THE DETERMINATION OF OXYGEN, HYDROGEN, NITROGEN, AND CARBON IN NONFERROUS METALS AND ALLOYS. J. H. Edgerton and H. G. Davis. Sept. 2, 1954. 14p. Contract [W-7405-eng-26]. $3.30(ph OTS); $2.40(mf OTS).

The equipment for the determination of H_2, O_2, N_2, and C in metals and alloys is briefly reviewed. Diagrams are given of vacuum fusion apparatus for the determinations. (B.J.H.)

10708 CF-55-7-16

Oak Ridge National Lab., Tenn.

EFFECT OF PRE-CLEANING OF GLASS SAMPLERS ON THE OXYGEN CONTENT OF SODIUM. J. C. White. July 5, 1955. Decl. Apr. 4, 1956. 3p. Contract W-7405-eng-26. $1.80(ph OTS); $1.80(mf OTS).

Molten Na flushing exerts a cleansing action on glass Na sampling tubes. The O_2 content of the Na used in this study was so high that the results are not conclusive for the chromic acid cleansing. (T.R.H.)

10709 HW-29319

Hanford Atomic Products Operation, Richland, Wash.

THE DETERMINATION OF Cu^{64} IN REACTOR EFFLUENT WATER BY ELECTRODEPOSITION. R. W. Perkins. Sept. 16, 1953. Decl. Feb. 1, 1956. 14p. Contract [W-31-109-Eng-52]. $3.30(ph OTS); $2.40(mf OTS).

An analytical method for Cu^{64} in reactor effluent was studied based upon electrodeposition of the active Cu with inert Cu carrier. A two hr plating time was employed at a current density of 10 ma/cm^2 and 4 volts across the cell. A stainless-steel cathode plate was used. Carrier yields of greater than 80% were obtained with a standard deviation of the yield-corrected counting rate as low as 0.24%. Very little, if any contamination by other radioactive elements present was shown by decay curve studies. Self-absorption and self-scatter factors to correct the counting rate were obtained. (auth)

10710 IDO-14218

American Cyanamid Co. Atomic Energy Div., Idaho Falls, Idaho.

EVALUATION OF CPP JET SAMPLERS. Investigation Order No. 133. A. E. Erhard. Feb. 11, 1953. Decl. Apr. 11, 1956. 13p. [Contract AT(10-1)-177]. $3.30(ph OTS); $2.40(mf OTS).

Under normal operating conditions a representative sample of a dissolver or feed adjustment tank is obtained by the jet samplers in the (Idaho Chemical Processing Plant) CPP in about one minute. Because of uncertainties in jet operation, it is recommended that the present 10 min circulation period be continued. Flow rates of liquid through 3 different samplers were determined for various air pressures in order to determine individual differences between samplers. The hold-up of liquid in the sample system is calculated for a sampler in operation to give about 5 throughputs per minute at 60 psi jet pressure. (auth)

10711 KAPL-M-LWN-2

Knolls Atomic Power Lab., Schenectady, N. Y.

THE POLAROGRAPHY OF THE LOWER OXIDATION STATES OF RUTHENIUM IN PERCHLORIC ACID SOLUTIONS. L. W. Niedrach and A. D. Tevebaugh. Mar. 2, 1950. 22p. Contract W-31-109-Eng-52. $4.80(ph OTS); $2.70(mf OTS).

The polarography of Ru(IV) and lower oxidation states has been investigated in perchloric acid solutions using the dropping mercury electrode. Well developed polarograms were obtained for Ru(IV) and Ru(III). The former showed three waves, the first two being attributed to reductions of different hydrolysis species of Ru(IV) to Ru(III) and the third to further reduction to Ru(II). Ru(III) is reduced in one step to Ru(II). No anodic waves were obtained at po-

tentials more negative than the dissolution wave for Hg. The oxidation states of the products of the polarographic reductions were identified by macro reductions with amalgams and electrolytically at controlled potentials. Estimations for the standard potentials for two Ru couples in 1M perchloric acid were obtained. (auth)

10712 M-4233
Princeton Univ., N. J. Frick Chemical Lab.
STUDIES OF THE COLORIMETRIC DETERMINATION OF IRON. N. H. Furman and Bruce McDuffie. 1945. Revised Dec. 1947. Decl. Oct. 6, 1955. 12p. $3.30(ph OTS); $2.40(mf OTS).

The separation and estimation of small quantities of Fe in U, UF_4, and Mg by the 1,10-phenanthroline method is described. The effects of pH and other variables on the determination are discussed. (C.W.H.)

10713 M-4234
Princeton Univ., N. J. Frick Chemical Lab.
STUDIES OF THE COLORIMETRIC PROCESS FOR THE ESTIMATION OF NICKEL WITH DIMETHYLGLYOXIME. N. H. Furman and Bruce McDuffie. 1946. Revised Dec. 1947. Decl. Oct. 6, 1955. 14p. $3.30(ph OTS); $2.70 (mf OTS).

The metastable dimethylglyoxime complex that is usually used in the colorimetric estimation of Ni is best formed at pH 9.5 in a solution containing ammonium ion to the extent of 0.5 to 2 moles per liter. Copper interferes seriously in this method. The stable Ni-dimethylglyoxime complex that forms at pH 12 or higher is best formed with potassium persulfate as oxidant. The color develops slowly and can not be read sooner than an hour after preparing the solutions. With amounts of Ni greater than 0.4 mg. per 100 ml the extinction should not be read until 2½ hr have elapsed. The color is stable for many hours when fully developed. (auth)

10714 M-4235
Princeton Univ., N. J. Frick Chemical Lab.
A COLORIMETRIC METHOD FOR THE DETERMINATION OF SMALL AMOUNTS OF CUPFERRON. W. E. Bunce and N. H. Furman. Jan. 17, 1946. Decl. Oct. 6, 1955. 5p. $1.80(ph OTS); $1.80(mf OTS).

10715 M-4242
Princeton Univ., N. J. Frick Chemical Lab.
THE DETERMINATION OF URANIUM WITH STANDARD POTASSIUM BROMATE. W. Chorney and N. H. Furman. [194?]. Decl. Oct. 6, 1955. 4p. $1.80(ph OTS); $1.80 (mf OTS).

An analytical procedure is presented for the determination of U^{4+} by titration with $KBrO_3$. Prior to titration, UO^{2+} is reduced to U^{3+} in a Jones reductor followed by aeration to U^{4+}. Methyl orange is the indicator. (C.W.H.)

10716 M-4247
Princeton Univ., N. J. Frick Chemical Lab.
THE DETERMINATION OF URANIUM WITH CHROMOTROPIC ACID. N. H. Furman and W. B. Mason. 1946. Revised Dec. 1947. Decl. Oct. 6, 1955. 4p. $1.80(ph OTS); $1.80(mf OTS).

A very sensitive spectrophotometric method for the determination of U^{6+} in pure solutions such as from the semi-micro double-cupferron separation is described. The color producing reagent is 1,8 dihydroxynaphtalene-3,6-disulfonic acid. (T.R.H.)

10717 M-4249
Princeton Univ., N. J. Frick Chemical Lab.
THE DIRECT COLORIMETRIC DETERMINATION OF NICKEL IN THE PRESENCE OF URANIUM. N. H. Furman, G. P. Haight, Jr., and Bruce McDuffie. Dec. 1946. Decl. Oct. 6, 1955. 5p. $1.80(ph OTS); $1.80(mf OTS).

Detailed procedures are presented for the application of the dimethyl glyoxime method to the colorimetric estimation of Ni in U, its salt and ores. Copper interferes with the application of the method. A correction can be made for the color that is developed by Co in the procedure. (auth)

10718 M-4250
Princeton Univ., N. J. Frick Chemical Lab.
A COMPARISON OF METHODS FOR THE DETERMINATION OF CADMIUM IN MAGNESIUM. C. E. Bricker and N. H. Furman. 1946. Revised Dec. 1947. Decl. Oct. 6, 1955. 12p. $3.30(ph OTS); $2.70(mf OTS).

The dithizone extraction-colorimetric method and the dithizone extraction-polarographic method compared unfavorably with the electrolysis-Hg distillation-polarographic method in these experiments. (T.R.H.)

10719 M-4254
Princeton Univ., N. J. Frick Chemical Lab.
THE LOSS OF NITROGEN DURING THE SOLUTION OF URANIUM IN HYDROCHLORIC ACID AND HYDROGEN PEROXIDE AND THE SUBSEQUENT DISTILLATION. N. H. Furman and R. J. Mundy. 1946. Revised Sept. 1947. Decl. Oct. 6, 1955. 10p. $3.30(ph OTS); $2.40 (mf OTS).

Based on work reported in MSA Report A-1000, June 18, 1943.

Experiments have been described that indicate the formation of hypochlorite by the interaction of alkali and Cl_2 generated in the process of dissolving U in HCl plus H_2O_2. Low results in the subsequent estimation of N_2 may be due to the oxidation of NH_3 by the hypochlorite. (auth)

10720 NYO-2000
New Brunswick Lab., AEC, N. J.
MINUTES OF ZIRCONIUM CONFERENCE [HELD AT THE NEW BRUNSWICK LABORATORY], AUGUST 15, 1949. Clement J. Rodden. Decl. Jan. 30, 1956. 39p. $6.30(ph OTS); $3.00(mf OTS).

This report contains the following papers: Battelle Memorial Inst., Columbus, Ohio. CORROSION TEST METHOD FOR ZIRCONIUM IN 600°F WATER. July 26, 1949; and Massachusetts Inst. of Tech., Cambridge. Metallurgical Project. Letter from A. R. Kaufmann Re: IMPURITIES IN METAL; and DESCRIPTION OF E.E.S. CORROSION TESTING APPARATUS; and Argonne National Lab., Lemont, Ill. [CORROSION RESISTANCE OF ZIRCONIUM]; and California. Univ., Berkeley. Radiation Lab., HAFNIUM IN ZIRCONIUM; and OBSERVATIONS ON TRIBUTYL PHOSPHATE EXTRACTION OF ZIRCONIUM. E. H. Huffman.

The spectrographic analysis of Zr for impurities is briefly reviewed. The corrosion of Zr by double-distilled H_2O at 600°F and at high pressures was investigated. The mass spectrographic determination of Hf in Zr and the effects of impurities on the solvent extraction of Zr with TBP are discussed. (C.W.H.)

10721 NYOO-2002
New Brunswick Lab., AEC., N. J.
PHOTOMETRIC DETERMINATION OF TITANIUM IN ZIRCONIUM METAL. R. H. Beaumont, Jr. Aug. 1949. Decl. Jan. 26, 1956. 10p. $1.80(ph OTS); $1.80(mf OTS).

A method for the determination of Ti in Zr metal is presented. After the Zr metal is dissolved in HF, the interfering fluoride ion is removed by the addition of boric acid. The Ti metal is then determined photometrically by the peroxide method. Equivalent quantities of HF and boric acid must be added to the solutions used in preparing the standard curve. Corrections for the presence of V and Mo are discussed. Results are presented. (auth)

Refer also to abstracts 10802 and 10803.

CRYSTALLOGRAPHY AND CRYSTAL STRUCTURE

10722 KAPL-M-JSL-7
Knolls Atomic Power Lab., Schenectady, N. Y.
THE UNIT CELL AND SPACE GROUP OF AMMONIUM METAVANADATE. Joseph S. Lukesh. May 29, 1950. 4p. Contract W-31-109-eng-52. $1.80(ph OTS); $1.80 (mf OTS).

10723 KAPL-M-JSL-9
Knolls Atomic Power Lab., Schenectady, N. Y.
THE CRYSTAL STRUCTURE OF AMMONIUM META-VANADATE. A Preliminary Report. Joseph S. Lukesh. Jan. 25, 1951. 11p. Contract W-31-109-Eng-52. $3.30 (ph OTS); $2.40(mf OTS).

DEUTERIUM AND DEUTERIUM COMPOUNDS

10724 A-94
[Columbia Univ., New York].
PRODUCTION OF D_2O FOR USE IN THE FISSION OF URANIUM. Harold C. Urey, Aristid V. Grosse, and George Walden. June 23, 1941. Decl. May 21, 1956. 32p. $6.30(ph OTS); $3.00(mf OTS).

Brief discussions of experimental methods, kinetics, and the catalysts used in the production of D_2O are presented. (J.E.D.)

10725 CF-55-2-51
Oak Ridge National Lab., Tenn.
SOME PROPERTIES OF ThO_2-D_2O SLURRIES. TBR Memo No. 10. P. N. Haubenreich. Feb. 10, 1955. 8p. Contract [W-7405-eng-26]. $1.80(ph OTS); $1.80(mf OTS).

The density, heat capacity, thermal conductivity, and viscosity have been calculated for ThO_2-D_2O slurry systems. (W.L.H.)

Refer to abstract 10777.

GRAPHITE

10726 ANL-4153
Argonne National Lab., Lemont, Ill.
VOLATILIZATION OF URANIUM FROM URANIUM-IMPREGNATED GRAPHITE. J. G. Malm and G. W. Mason. July 23, 1948. Decl. Dec. 14, 1955. 39p. Contract W-31-109-38. $0.30(OTS).

The rate of loss of U from U impregnated graphite pieces heated in He (containing <0.01% O_2) at high temperatures has been determined and found to be quite low. Extrapolation of these laboratory experiments to full scale pile conditions entails numerous assumptions. However, it is estimated that the over-all U losses from a full-scale pile operating at temperatures as high as 1400°C would be less than 100 g. per year. The presence of a high concentration (ca. 0.1%) of O_2 impurity in the He may have a deleterious effect. During these experiments considerable data were obtained relative to the state of U in the graphite under various conditions. When graphite is impregnated with $UO_2(NO_3)_2$, dried, and fired in He (<0.01% O_2) at 800°C for thirty minutes, the U is present as U_3O_8. Continued heating at 800°C converts the U_3O_8 to UO_2. At ea. 1100°C in the absence of N_2 the UO_2 is converted to UC_2 which is stable in vacuo to at least 1400°C. In the presence of N_2, however, UN_2 is the stable form of U at 1100°C. At ca. 1400°C UN_2 is converted to UN which is then the stable form. All these compounds of uranium, UO_2, UC_2, UN_2, and UN are very reactive with O_2 even at room temperature. (auth)

10727 CF-50-1-20
Oak Ridge National Lab., Tenn.
THERMAL COLUMN GRAPHITE. J. A. Lane. Jan. 5, 1950. Decl. Feb. 14, 1956. 2p. Contract [W-7405-eng-26]. $1.80(ph OTS); $1.80(mf OTS).

Specifications for thermal column graphite are given. Two distinct advantages of GBF over AGOT are discussed in order to provide a basis for selection of the graphite. (F.S.)

10728 COO-202
Great Lakes Carbon Corporation, Morton Grove, Illinois.
HIGH DENSITY GRAPHITE. Final Report. M. W. Nathans. Sept. 2, 1954. Decl. Dec. 5, 1955. 70p. Contract AT(11-1)-221. $0.45(OTS).

The development of a conventional operation in the preparation of synthetic graphite of a density of 2.00, the modification and improvement of the present processes, development of new techniques, and the analysis of the products to determine the conditions best applicable to producing the highest density graphite possible with the highest strength characteristics are discussed. (J.E.D.)

10729 KAPL-M-JSL-5
Knolls Atomic Power Lab., Schenectady, N. Y.
ON THE CRYSTAL STRUCTURE OF GRAPHITE. J. S. Lukesh. July 19, 1949. 6p. Contract W-31-109-eng-52. $1.80(ph OTS); $1.80(mf OTS).

10730 M-2132
Johns Hopkins Univ., Baltimore.
MONTHLY TECHNICAL REPORT FOR PERIOD AUGUST 1, THROUGH AUGUST 31, 1945. W. B. Burford, III. Decl. Jan. 30, 1956. 12p. Contract W-7401-eng-43. $3.30(ph OTS); $2.40(mf OTS).

10731 NAA-SR-288
North American Aviation, Inc., Downey, Calif.
MEASUREMENT OF STORED ENERGY DURING QUASI-ISOTHERMAL ANNEALING OF IRRADIATED GRAPHITE. I. METHOD AND PRELIMINARY RESULTS. R. L. Carter. Nov. 12, 1953. Decl. Jan. 12, 1956. 31p. Contract AT-11-1-GEN-8. $0.25(OTS).

A sensitive technique permitting determination of the detailed annealing behavior of a sample upon insertion into a constant temperature oven has been developed. Application has been made to the annealing of stored energy from irradiated graphite. Preliminary analysis yields an annealing process of third order, together with at least two different simultaneous processes of first order, which describe all data obtained in the temperature region 150 to 200°C. This paper discusses the experimental and analytical methods used and presents a summary of the tentative results obtained to date. (auth)

LABORATORIES AND EQUIPMENT

10732 HW-26175
Hanford Works, Richland, Wash.
DEVELOPMENT OF THE HANFORD SLAVE MANIPULATOR FOR USE IN THE MULTICURIE CELLS AT HANFORD. Richard E. Field and John F. Gifford. Oct. 31, 1952. Changed from OFFICIAL USE ONLY July 6, 1956. 24p. Contract W-31-109-eng-52. $4.80(ph OTS); $2.70 (mf OTS).

The Hanford Slave Manipulator is a mechanical arm used by chemists and metallurgists to operate remote equipment within completely enclosed cells at Hanford. The seven independent motions are mechanical with pure slave action in all except the vertical motion. In this motion a downward movement of the Telescoping Arm on one side of the wall results in an upward movement of the arm on the other side of the wall, which is an advantage in viewing operations through a shielding window. Various tools may be interchanged quickly on the tool end by inserting the finger assembly into a rack within the cell and then rotating until

free of the bayonet lock. The tool end is then withdrawn from the fingers and plugged into any other type of tool contained in the rack. The manipulator may be used to handle toxic or explosive chemicals, radioactive solutions and equipment, and hot or inflammable objects from a remote station. It is so designed that a plastic or rubber gauntlet may be used to protect it from corrosion, and to aid in decontamination. One Hanford Slave Manipulator has been used successfully for metallurgy work. Several more have been manufactured by a commercial fabricator at a cost of approximately $2,500 each. (auth)

RADIATION CHEMISTRY

10733 CC-2800(Del.)
[Chicago. Univ. Metallurgical Lab.]
CHEMICAL RESEARCH—RADIATION CHEMISTRY; REPORT FOR MONTH ENDING MARCH 15, 1945. Decl. Feb. 15, 1956. 11p. Contract W-7401-eng-37. $3.30 (ph OTS); $2.40(mf OTS).

Investigations were continued on the evolution of H_2 and O_2 from irradiated $UO_2(NO_3)_2$ solutions, and on the radiolysis of solid $BaSO_4$ and $Ba(NO_3)_2$. The pH drop of the CP-3 moderator after extended reactor operation was also studied. (C.W.H.)

10734 CF-54-1-122
Oak Ridge National Lab., Tenn.
THE RADIATION CHEMISTRY OF HOMOGENEOUS REACTOR SYSTEMS. III. HOMOGENEOUS CATALYSIS OF THE HYDROGEN—OXYGEN REACTION. H. F. McDuffie, E. L. Compere, H. H. Stone, L. F. Woo, and C. H. Secoy. Jan. 26, 1954. Decl. Feb. 28, 1956. 44p. Contract W-7405-eng-26. $0.30(OTS).

Hydrogen and oxygen dissolved in aqueous solu ons at elevated temperatures were found to react smoothly to form H_2O when dissolved Cu salts are present as catalysts. The reaction suppresses the formation of H_2-O_2 gas bubbles from the decomposition of H_2O by fission products. Reaction kinetics were investigated. The rate determining step appears to be the reaction of dissolved H_2 with the dissolved Cu, and the activation energy is around 24 kcal/mol. (F.S.)

10735 IDO-16283
Phillips Petroleum Co. Atomic Energy Div., Idaho Falls, Idaho.
EFFECT OF NEUTRON INTERACTION ON CRITICALITY OF UNEQUAL SIZE VESSELS. J. W. Webster and G. A. Cazier. Sept. 26, 1955. 4p. Contract AT(10-1)-205. (PTR-5). $1.80(ph OTS); $1.80(mf OTS).

A study was made of the criticality hazards presented by the disengaging pots at the bottom of the strip columns in the Arco Chemical Plant. Estimates were made of the reduction of the critical concentration in the pot and column due to neutron interaction. (B.J.H.)

SEPARATION PROCEDURES

10736 A-519
Du Pont de Nemours (E. I.) and Co. Engineering Dept., Wilmington, Del.
DESIGN OF ETHER-WATER CONTACTING SYSTEM. Final Report. T. H. Chilton, J. B. Tepe, and W. K. Woods. Jan. 18, 1943. Decl. Dec. 8, 1955. 90p. Contract OEMsr-788. (100XR-113). $13.80(ph OTS); $4.80(mf OTS).

A study was made of the design and construction of equipment for a semi-works trial of the separation of U^{235} by selective distribution between saturated diethyl ether and saturated water solutions of $UO_2(NO_3)_2$. The isotopic distribution coefficient was believed to be between 1.0006 and 1.0002. Subsequent distribution coefficients did not check early results and the work was terminated. (F.S.)

10737 A-1030
Yale Univ., New Haven. Sterling Chemistry Lab.
EXTRACTION OF VALUABLE CONSTITUENTS OF PITCHBLENDE ORES. SECTION I. THE DIGESTION OF BBB ORE WITH NITRIC ACID. Progress Report. Scott E. Wood, James English, Jr., Herbert M. Clark, Edward J. King, James L. Miller, Andrew S. Tomcufcik, and Howard R. Brownell. Mar. 27, 1944. Decl. Oct. 13, 1955. 26p. $4.80(ph OTS); $2.70(mf OTS).

Four series of digestions of pitchblende ores were made with HNO_3 using various acid concentrations and digestion times. Results indicate that more than 97% U was obtained at pH = 1 and 80 to 90°C. For high percentage extraction, 3.6 times stoichiometrical HNO_3 or greater is required. In treating African pitchblendes continuous ether extraction of a nitrate solution can give adequate results. Assays were also carried out by a procedure involving H_2S precipitation followed by a cupferron treatment. (F.S.)

10738 AECD-4003
Tennessee Eastman Corp., Oak Ridge, Tenn.
REACTIVITY OF DIBUTYL CARBITOL. C. D. Susano. Apr. 1, 1947. Decl. Jan. 5, 1956. 24p. Contract W-7401-eng-23. (H-1.740.8(Paper 11)). $4.80(ph OTS); $2.70(mf OTS).

The nature and degree of reactivity of dibutyl carbitol—nitric acid mixtures are described. It has been observed that mixtures of dibutyl carbitol and HNO_3 containing NO or reducing agents are susceptible to varying degrees of reactivity depending on the concentration of the HNO_3. Indications are that the reaction of HNO_3 and dibutyl carbitol proceeds in two steps, fission and hydrolysis, and oxidation. Products of the reaction are CO_2, NO and monobutyl cellosolve, oxalic acid, and small amounts of organic acids. The presence of monobutyl carbitol, up to 20% in dibutyl carbitol enhances the distribution coefficient of dibutyl carbitol for U from aqueous, HNO_3 solutions. (W.L.H.)

10739 AECD-4108
Massachusetts Inst. of Tech., Watertown, Mass. Mineral Engineering Lab.
REMOVAL OF URANIUM FROM RAND LEACH LIQUORS WITH ANION EXCHANGE RESINS. PART V. FURTHER STUDIES ON PROCESS X SOLUTIONS. Norman N. Schiff. Mar. 30, 1951. Decl. Dec. 20, 1955. 9p. Contract AT-30-1-Gen-211. (MITG-A107). $0.15(OTS).

The effects of pH, temperature, and retention time of the leach liquor on resin capacity and precipitate grade were studied by means of non-cyclic column tests. The capacity of the resin, amberlite IRA-400, for U at cutoff increases with increasing pH, temperature, or retention time. The grade of precipitate obtained on neutralization of the eluate increases with decreasing pH. (J.E.D.)

10740 AECD-4181
Tennessee Eastman Corp., Oak Ridge, Tenn.
THE SEPARATION OF URANIUM FROM THORIUM; THE OXALIC ACID LEACH. E. W. Christopherson, H. R. Grady, R. W. Woodard, and C. E. Larson. July 3, 1946. Decl. Feb. 15, 1956. 12p. Contract W-7401-eng-23. (C-0.380.7). $3.30(ph OTS); $2.40(mf OTS).

The use of the oxalic acid method for the separation of U from mixed Th—U peroxides has been investigated, and appears to be the most satisfactory of the obvious methods of separation. One oxalic acid leach removes nearly all of the U from the Th with approximately one mg Th/L remaining in the U solution phase. An excess of 10% oxalic acid, and a HNO_3 concentration of 0.1M, or less, is recommended. The use of thoron as a colorimetric reagent for

the detection of small quantities of Th has been employed quite satisfactorily. A solubility product constant of 7.0×10^{-20} is reported for Th oxalate. (auth)

10741 BMI-237
Battelle Memorial Inst., Columbus, Ohio.
RECOVERY OF URANIUM FROM NORTH DAKOTA LIGNITES. Final Report. R. A. Ewing, H. W. Adam, F. W. Miles, A. E. Bearse, and A. C. Richardson. July 31, 1950. Decl. Apr. 11, 1956. 52p. Contract W-38-094-eng-27. $0.35(OTS).

The mineralogy of a North Dakato lignite sample was studied, and an estimated mineralogical composition is presented. Results of a series of float-sink tests of raw lignite are included. Chemical analyses of several samples of North Dakota lignite are presented. Recovery of U from a sample of North Dakota lignite (0.013% of U) by hydrometallurgical methods was investigated briefly. Uranium extractions of 80 to 99% were obtained with a H_2SO_4 leach of lignite ash; acid consumption was approximately 850 lbs/lb of U extracted. Uranium extractions from lignite ash with a carbonate leach were from 65 to 75%; sodium carbonate consumption was approximately 1000 lbs/lb of unbeneficiated ash. This was reduced to about 300 lbs/lb of U extracted when most of the sulfate was removed from the lignite before leaching. (auth)

10742 BMI-238
Battelle Memorial Inst., Columbus, Ohio.
RECOVERY OF URANIUM FROM PHOSPHATE ROCK. Final Report. E. F. Stephan, John Chocholak, Iver Igelsrud, and H. A. Pray. June 30, 1950. Decl. Apr. 11, 1956. 101p. Contract W-38-094-eng-27. $0.50(OTS).

Processes investigated for the recovery of U from phosphate rock and from superphosphate and H_3PO_4 derived from phosphate rock are discussed. Leaching and precipitation techniques are described. Since phosphate rock contains only about 0.01% of U processes for recovery are expensive. However, the large domestic reserves make phosphate rock a potential source of substantial amounts of U in the future. (auth)

10743 BMI-240
Battelle Memorial Inst., Columbus, Ohio.
THE CONCENTRATION OF PITCHBLENDE. Progress Report. A. L. Wesner, O. F. Tangel, and A. C. Richardson. June 30, 1950. Changed from OFFICIAL USE ONLY Oct. 10, 1955. 16p. Contract AT-30-1-Gen-228. $3.30 (ph OTS); $2.40(mf OTS).

Additional work on the flotation of sulfides from high-sulfur pitchblende is described. Data needed for the selection of flotation equipment are presented. (auth)

10744 BMI-241
Battelle Memorial Inst., Columbus, Ohio.
EXAMINATION OF RESIDUES FROM THE NITRIC ACID DIGESTION OF PITCHBLENDE. B. Langston, O. F. Tangel, and A. C. Richardson. July 31, 1950. Changed from OFFICIAL USE ONLY Oct. 10, 1955. 10p. Contract AT-30-1-gen-228. $1.80(ph OTS); $1.80(mf OTS).

The mineralogical characteristics of two residues from the nitric acid digestion of pitchblende concentrates from the Mallinckrodt Chemical Works are described. The major constituents were identified as quartz, lead sulfate, tourmaline, and monazite. (auth)

10745 BMI-JDS-100
Battelle Memorial Inst., Columbus, Ohio.
CHEMICAL PROCESS TO RECOVER URANIUM FROM PHOSPHATE ROCK. E. F. Stephan, L. T. Hendrix, and Iver Igelsrud. Jan. 15, 1948. Decl. Mar. 5, 1956. 20p. Contract W-38-094-eng-27. $0.20(OTS).

10746 BMI-JDS-101
Battelle Memorial Inst., Columbus, Ohio.
RECOVERY OF URANIUM FROM SHALES. A. E. Bearse, J. Chocholak, R. F. Devine, S. J. Kiehl, Jr., and D. D. Rabb. Jan. 15, 1948. Decl. Mar. 5, 1956. 21p. Contract AT-30-1-gen-202. $0.25(OTS).

10747 BMI-JDS-126
Battelle Memorial Inst., Columbus, Ohio.
CHEMICAL PROCESS TO RECOVER URANIUM FROM PHOSPHATE ROCK. Iver Igelsrud, E. F. Stephan, John Chocholak, C. M. Schwartz, and A. E. Austin. June 30, 1948. Decl. Mar. 5, 1956. 29p. Contract W-38-094-eng-27. $0.25(OTS).

The progress made in the chemical dissolution and recovery of U from phosphate rock is described. Several developments are reported: an increase in the dissolution of U from the rock with H_2SO_4 from 85% to 95%; recovery and re-use of the amine used in precipitating the U from superphosphate leach solutions; nearly quantitative removal of U from leach solutions with finely divided gas-mask C; and a cyclic process for leaching phosphate rock with H_3PO_4 which avoids subsequent evaporation to recover P_2O_5. (auth)

10748 BMI-JDS-130
Battelle Memorial Inst., Columbus, Ohio.
RECOVERY OF URANIUM FROM SHALES. A. E. Bearse, R. F. Devine, R. A. Ewing, J. F. Foster, and S. J. Kiehl, Jr. June 30, 1948. Decl. Mar. 5, 1956. 91p. Contract AT-30-1-gen-202. $0.45(OTS).

Progress has been made in developing more economical procedures for the extraction of U from native carbonaceous shales containing approximately 0.007% of U. Most of the recent work has been concerned with utilizing the high-sulphur content (5 to 7%) of these shales as a means of solubilizing the uranium present. It has been found that by roasting the shale under controlled conditions approximately 70% of the U present can be solubilized (presumably sulphated) and extracted by subsequent treatment with Na_2CO_3 solution. Roasting time and temperature, agitation of the shale bed during roasting, and rate of air flow over the bed appear to be significant factors in determining U extractions. There are preliminary indications that dilute H_2SO_4 can be used instead of Na_2CO_3 for the extraction step, with a possible simplification in recovery of the U from the solution, and a lower reagent cost. Present indications are that the most promising method of recovering U from shale will involve roasting the shale under carefully controlled conditions, leaching with dilute H_2SO_4 or with Na_2CO_3 or $(NH_4)_2CO_3$ solutions, and precipitating from these leach solutions by methods still to be developed. A separate section of this report is concerned with the work in progress on the recovery of fuel values from shale. (auth)

10749 BMI-JDS-141
Battelle Memorial Inst., Columbus, Ohio.
RECOVERY OF URANIUM FROM SHALES. A. E. Bearse, S. Calvert, C. G. Cichocki, R. F. Devine, R. A. Ewing, S. J. Kiehl, Jr., and F. W. Miles. Sept. 15, 1948. Decl. Mar. 5, 1956. 41p. Contract AT-30-1-Gen-202. $0.30 (OTS).

10750 BMI-JDS-156
Battelle Memorial Inst., Columbus, Ohio.
RECOVERY OF URANIUM FROM SHALES. A. E. Bearse, R. A. Ewing, S. Calvert, C. G. Cichocki, R. F. Devine, S. J. Kiehl, Jr., F. W. Miles, and R. Q. Wilson. Dec. 15, 1948. Decl. Mar. 5, 1956. 67p. Contract AT-30-1-gen-202. $0.40(OTS).

10751 BMI-JDS-194
Battelle Memorial Inst., Columbus, Ohio.
RECOVERY OF URANIUM FROM SHALES. Quarterly

Report [for] March 15 to June 15, 1949. A. E. Bearse, R. A. Ewing, R. F. Devine, S. J. Kiehl, Jr., G. A. Lutz, F. W. Miles, H. P. Munger, and R. E. Sharpe. June 15, 1949. Decl. Mar. 7, 1956. 130p. Contract AT-30-1-gen-202. $0.65(OTS).

10752 BMI-JDS-197
Battelle Memorial Inst., Columbus, Ohio.
RECOVERY OF FUEL VALUES FROM OIL SHALE. Final Report. J. F. Foster, D. A. Vorum, and F. Benington. Sept. 1, 1949. Decl. Mar. 12, 1956. 56p. Contract AT-30-1-gen-202. $0.40(OTS).

The investigation of the methods of fuel recovery, and the chemical and other characteristics of the shale are discussed insofar as these properties are immediately pertinent to the selection and development of a practical fuel-recovery process. The fundamental studies are described, discussing the chemical and physical properties of the shale which are known, and the methods used in obtaining additional information. (auth)

10753 BMI-JDS-201
Battelle Memorial Inst., Columbus, Ohio.
RECOVERY OF URANIUM FROM PHOSPHATE ROCK BY THE BATTELLE MONOCALCIUM PHOSPHATE PROCESS. SECTION I. Iver Igelsrud, John Chocholak, E. F. Stephan, and H. A. Pray. SECTION II. J. F. Shea, R. F. Hauser, O. F. Tangel, and A. C. Richardson. June 30, 1949. Decl. Mar. 8, 1956. 103p. Contract W-38-094-eng-27. $0.55(OTS).

10754 BMI-JDS-203
Battelle Memorial Inst., Columbus, Ohio.
MINERAL COMPOSITION AND MINERAL ASSOCIATION OF URANIUM IN SHALE. Donald W. Scott, Howard Adam, J. W. Cookston, A. E. Austin, C. M. Schwartz, and Paul Miller. June 30, 1949. Changed from OFFICAL USE ONLY Mar. 8, 1956. 34p. Contract AT-30-1-Gen-202. $0.30(OTS).

A description of the mineral composition and the mineral association of uranium in shale sample LC 201-113, obtained by the U. S. Geological Survey from the Chattanooga Shale Bed in the vicinity of Sparta, Tennessee (Sligo adit) is reported. The uranium was intimately associated with all of the mineral phases of the rock. The quartz and feldspar carried less U than the illite and chlorite, whereas the iron sulphides, pyrite, and marcasite carried slightly more. Strictly physical methods of concentration do not offer promise for producing an upgraded product for further processing by chemical methods. The first two objectives of the study, to establish the mineral composition of the shale and the mineral association of the uranium and to evaluate concentration methods for up-grading the shale, were attained. It was established that the uranium was so intimately associated with all of the mineral phases that it could not be up-graded by physical methods of concentration. The third and final objective, to explain the association of the uranium as an aid to directing the recovery studies, was not investigated. (auth)

10755 BMI-JDS-214
Battelle Memorial Inst., Columbus, Ohio.
URANIUM RECOVERY FROM FLORIDA PHOSPHATES. H. W. Adam, J. W. Cookston, R. Meaders, O. F. Tangel, and A. L. Wesner. Aug. 31, 1949. Decl. Apr. 11, 1956. 42p. Contract W-38-094-eng-27. $7.80(ph OTS); $3.30 (mf OTS).

The problems involved in recovering U from Florida phosphates, including overburden and the various waste products obtained in washer plants, are evaluated. (F.S.)

10756 BMI-JDS-232
Battelle Memorial Inst., Columbus, Ohio.
PROGRESS REPORT ON THE CONCENTRATION OF PITCHBLENDE. Adam L. Wesner, Benny Langston, O. F. Tangel, and A. C. Richardson. May 25, 1950. Changed from OFFICIAL USE ONLY Oct. 10, 1955. 18p. Contract AT-30-1-Gen-228. $3.30(ph OTS); $2.40(mf OTS).

An ore dressing method to reduce the sulfur content of pitchblende was found in a simple flotation scheme. The recovery in the U concentrate was at least 99.7% of the total U. The flotation process is feasible for separating only one or two specific minerals. Over-all gravity concentration does not appear promising from the standpoint of increasing the grade of U in the concentrate without substantial loss of U. (F.S.)

10757 CC-3017
[California. Univ., Berkeley. Radiation Lab.]
THE EXTRACTION OF URANIUM INTO HEXONE AS URANYL THIOCYANATE FROM THORIUM NITRATE SOLUTIONS. William H. Reas. May 18, 1945. Decl. Feb. 14, 1956. 13p. Contract W-7405-eng-48B. $3.30(ph OTS); $2.40(mf OTS).

Some studies of problems encountered in development of the process for extraction of U from $Th(NO_3)_4$ solutions as $UO_2(SCN)_2$ with hexone are reported. The reaction of HNO_3 with KCN, the distributions of HNO_3 KCN, $Th(SO_4)_2$, Pa, and fission elements, and the use of a stripper column with 0.5M $Th(NO_3)_4$ are discussed. (T.R.H.)

10758 CF-52-6-164
[Oak Ridge National Lab., Tenn.]
DESIGN OF FRACTIONATION PERCOLATORS. Stanley H. Jury. June 26, 1952. 16p. Contract [W-7405-eng-26]. $3.30(ph OTS); $2.40(mf OTS).

A detailed analysis and method are given for designing a fractionation percolator with a dense bed of porous granular solid moving continuously countercurrent to the solution stream in the case of a binary ion exchange system. (F.S.)

10759 CF-52-7-132
Oak Ridge National Lab., Tenn.
EQUATIONS USEFUL IN DETERMINING SEPARATION FACTORS BY REPEATED BATCH EXTRACTION AND EQUILIBRATION. J. T. Roberts. July 14, 1952. 10p. Contract [W-7405-eng-26]. $1.80(ph OTS); $1.80(mf OTS).

Equations are presented which govern the case of two components in one phase being repeatedly partially extracted into a second phase and the two phases equilibrated. Simplified equations result if the separation factor for the distribution of the two components between the two phases at equilibrium is nearly unity. (auth)

10760 CF-55-10-46
Oak Ridge National Lab., Tenn.
RAW MATERIALS ECONOMIC STUDIES: A PRELIMINARY ESTIMATE OF THE COST OF URANIUM RECOVERY USING DALPHEX SLURRY PROCESS. B. B. Klima and R. R. Wiethaup. Oct. 18, 1955. 14p. Contract [W-7405-eng-26]. $3.30(ph OTS); $2.40(mf OTS).

The cost of recovering U from H_2SO_4 slurry by solvent extraction with di(2-ethylhexyl) H_3PO_4 (D2EHPA) dissolved in kerosene containing 3 vol. % of tributyl phosphate is discussed. The estimate is based upon the results of laboratory and process testing work. (W.L.H.)

10761 CF-55-10-66
Oak Ridge National Lab., Tenn.
RAW MATERIALS ECONOMIC STUDIES: A PRELIMINARY ESTIMATE OF THE COST OF URANIUM RECOVERY USING DALPHEX CLARIFIED LEACH LIQUOR PROCESS. B. B. Klima, R. R. Wiethaup, and R. H. Guymon. Oct. 20, 1955. 15p. Contract [W-7405-eng-26]. $3.30(ph OTS); $2.40(mf OTS).

The cost of recovery of U from a clarified H_2SO_4 leach liquor by solvent extraction using dialkyl phosphoric acid (Dalphex Process) is discussed. The estimate is based upon the results of laboratory work. (W.L.H.)

10762 CF-55-11-30

Oak Ridge National Lab., Tenn.

A NEW CALCULATION METHOD FOR EVALUATING SOLVENT EXTRACTION CONTACTOR PERFORMANCE. M. E. Whatley. Nov. 3, 1955. 11p. Contract W-7405-eng-26. $3.30(ph OTS); $2.40(mf OTS).

A new method of calculating the performance of solvent extraction contractors is presented in its conceptual form. This method is similar to the conventional HETS and HTU methods developed from the concept of a differential height of column being equivalent to a mixer settler stage with differential efficiency. Some of its implications and advantages are discussed. (auth)

10763 CF-55-12-112

Oak Ridge National Lab., Tenn.

RAW MATERIALS ECONOMIC STUDIES: A PRELIMINARY EXTIMATE OF THE COST OF URANIUM RECOVERY USING THE DAPEX SLURRY PROCESS, III. B. B. Klima, R. R. Wiethaup, and R. H. Guymon. Dec. 23, 1955. 16p. Contract [W-7405-eng-26]. $3.30(ph OTS); $2.40(mf OTS).

Cost estimates are presented for recovering U from H_2SO_4 leach slurry by solvent extraction using a dialkyl phosphoric acid (Dapex Process). The purpose is to examine the economic feasibility of removing the sands between extraction stages rather than before or after. The estimate is based upon results of laboratory and process testing work. (W.L.H.)

10764 CN-828

[Chicago. Univ.] Metallurgical Lab.

TECHNOLOGY—CHEMICAL ENGINEERING; REPORT FOR MONTH ENDING JULY 26, 1943. Decl. Jan. 18, 1956. 15p. Contract [W-7401-eng-37]. $3.30(ph OTS); $2.40(mf OTS).

Laboratory-scale studies on the Bismuth Phosphate Process were continued with emphasis on the dissolution and extraction steps. Steam jets were used to transfer process solutions and slurries. (C.W.H.)

10765 HW-38837

Hanford Atomic Products Operation, Richland, Wash.

REDOX VENTILATION STUDY RECOMMENDATION REPORT. B. O. Shaver and L. J. Nitteberg. Sept. 6, 1955. 45p. Contract [W-31-109-eng-52]. $10.80(ph OTS); $3.90 (mf OTS).

The airborne contamination in the Redox building can be controlled by modifications in the ventilation system. Three proposed methods for increasing the flow of air into or across the open canyon cells during maintenance operations are: vertical cell ventilation unit, maintenance ventilation increase system, and canyon aisle duct system. (C.W.H.)

10766 K-427(Rev.)

Massachusetts Inst. of Tech., Oak Ridge, Tenn. Engineering Practice School.

PURIFICATION OF METHYL ISOBUTYL KETONE. W. P. Jensen, D. W. Bartholomew, and E. J. Freeh. Feb. 14, 1950. Decl. May 29, 1956. 22p. For Oak Ridge National Lab. Contract [W-7405-Eng-26], Subcontract 70. $3.30 (ph OTS); $2.40(mf OTS).

Methyl isobutyl ketone samples containing from 0.2% to 0.67% methyl isobutyl carbinol were treated with HNO_3–$Na_2Cr_2O_7$ solutions to oxidize the alcohol. Optimum conditions of concentrations and treatment time for lowering the alcohol concentration to approximately 0.02% were determined. (auth)

10767 K-443

Carbide and Carbon Chemicals Corp. K-25 Plant, Oak Ridge, Tenn.

SEPARATION OF CESIUM FROM SODIUM BY MEANS OF FULLERS EARTH. H. L. Bench and H. B. Weisblatt. July 15, 1949. Decl. May 25, 1956. 14p. Contract [W-7405-eng-26]. $3.30(ph OTS); $2.40(mf OTS).

The adsorptive capacity of Fullers earth for Cs in solutions containing high concentrations of sodium salts was found to be greater than 0.04 gm of CsCl per gm of earth. The optimum removal of Cs from these solutions was found to occur at a pH of 11. A feasible process for the decontamination of these solutions from Cs^{137} was developed using Fullers earth. (auth)

10768 KAPL-M-JRG-2

Knolls Atomic Power Lab., Schenectady, N. Y.

REMOVAL OF MERCURY FROM SIR COOLANT (E-3 EXPERIMENTS). John R. Gould and J. G. Gratton. Oct. 17, 1955. 5p. Contract W-31-109-Eng-52. $1.80(ph OTS); $1.80(mf OTS).

The removal of Hg from Na (SIR coolant) by precipitation as a Ca–Hg compound was studied. No evidence of a Ca–Hg reaction was observed over a period of 10 hr. at 700°K; however, the reaction goes to completion within ½ hr at 870°K. The solubility of Hg_xCa_y in a Na solution is approximately 0.1 to 0.3 wt. % at 870°F. (C.W.H.)

10769 M-3451

[Princeton Univ., N. J. Frick Chemical Lab.]

SOME FACTUAL CONSIDERATIONS RELATING TO THE DISTRIBUTION OF URANYL NITRATE BETWEEN WATER AND DIETHYL ETHER. N. H. Furman. [1946?]. Decl. Oct. 6, 1955. 11p. $3.30(ph OTS); $2.40(mf OTS).

10770 M-4232

Princeton Univ., N. J. Frick Chemical Lab.

THE DISTRIBUTION OF MOLYBDENUM BETWEEN DIETHYL ETHER AND AQUEOUS SOLUTIONS. N. H. Furman, R. J. Mundy, and G. H. Morrison. Apr. 1947. Decl. Oct. 6, 1955. 9p. $1.80(ph OTS); $1.80(mf OTS).

10771 MITG-252

Massachusetts Inst. of Tech., Watertown, Mass. Mineral Engineering Lab.

LYOMETALLURGICAL TESTS ON MARYSVALE URANIUM ORES. F. W. Bloecher, Jr. Nov. 30, 1950. Decl. Jan. 11, 1956. 28p. Contract AT-30-Gen-211. $0.25(OTS).

Lyometallurgical leach tests have been run on samples of U ore from Marysvale, Utah. Uranium extractions range from 80 to 92% either by leaching raw ore with 10% nitrated ethyl ether or by leaching H_2SO_4-digested material with 5% nitrated ethyl ether. (auth)

10772 NAA-SR-1361

North American Aviation, Inc., Downey, Calif.

PYROCHEMICAL SEPARATION METHODS: III. THE REMOVAL OF FISSION PRODUCTS FROM MOLTEN, IRRADIATED URANIUM BY SOLID OXIDES. Albert M. Saul. Sept. 1, 1955. Decl. Jan. 12, 1956. 22p. Contract AT-11-1-Gen-8. $0.20(OTS).

Spent uranium fuel was heated in UO_2 and ZrO_2 crucibles at 1400°C and the resultant fission product extraction studied. Results indicate that ~99% of the rare earths, Sr, and Cs, and that 5 to 30% of the Pu are removed by this technique. (C.W.H.)

10773 NYOO-1005

Louisville, Ky. Univ. Inst. of Industrial Research.

PROGRESS REPORT FOR DECEMBER 1949. Gordon C. Williams, Simeon V. Galginaitis, E. G. Baker, Jr., A. H. Isaacs, E. W. Holzknecht, R. A. Gillespie, R. G. Moody, L. A. Graham, and R. Kaplan. Decl. Jan. 10, 1956. 29p. $4.80(ph OTS); $2.70(mf OTS).

Experiments in determining the vapor-pressure of technical $ZrCl_4$ were continued. Preliminary designs of a balanced diaphram apparatus for measuring the pressure in a pressure still for separating the chlorides of Hf and Zr are given. Experiments using organic solvents for splitting the $POCl_3$ complex of $ZrCl_4$ indicated some possibilities of precipitating phosphorus free $ZrCl_4$ from saturated toluene solutions. Operation of the stainless steel pilot plant column was continued as well as modifications to permit continuous operation. (auth)

10774 ORNL-1220

Oak Ridge National Lab., Tenn.

URANIUM CHEMISTRY OF RAW MATERIALS SECTION PROGRESS REPORT [FOR] OCTOBER 1, 1951 TO DECEMBER 31, 1951. Jan. 25, 1952. Decl. May 29, 1956. 61p. Contract W-7405-eng-26. $9.30(ph OTS); $3.60(mf OTS).

The uranium chemistry program has included studies of the behavior of hexavalent uranium in phosphate solutions; investigations of the solvent extraction of uranium from aqueous nitrate, sulfate, and phosphate solutions through the use of organic complexing agents; precipitation of uranium from aqueous solutions with organic compounds, studies with ion exchange resins, further examinations of the carbonate-uranium system; and studies of the reduction of uranium in sodium carbonate solutions with sodium hydrosulfite. Process development work has been concerned with the following projects: recovery of uranium from Bartow clay, recovery of uranium from acid leaches of Marysvale type ores, uranium recovery from carbonate solutions, recovery of uranium and vanadium from carnotite ores, and uranium recovery from metal production salvage. (auth)

10775 TID-5196

Yale Univ., New Haven. Sterling Chemistry Lab.

THE DISTRIBUTION OF RADIUM IN NITRIC ACID DIGESTIONS OF PITCHBLENDE. Henry C. Thomas. (1944?). Decl. Oct. 13, 1955. 19p. $3.30(ph OTS); $2.40 (mf OTS).

The sulfate-de-emanation method and perchlorate-de-emanation method for assay of various solids and solutions involved in the HNO_3 digestion of pitchblende are described. The role of various factors in the dissolution of Ra in the HNO_3-pitchblende digestions is investigated. It is shown that nearly all the Ra is dissolved and that the Ra may be removed by complete precipitation of the Pb. (T.R.H.)

10776 TID-5198

Yale Univ., New Haven. Sterling Chemistry Lab.

A STUDY OF METHODS OF CONTROLLING THE MOLYBDENUM CONTENT OF URANYL NITRATE PREPARED BY ETHER EXTRACTION FROM NITRATE SOLUTIONS OBTAINED BY A NITRIC ACID ATTACK OF PITCHBLENDE. Herbert M. Clark. [1944?]. Decl. Oct. 14, 1955. 21p. $4.80(ph OTS); $2.70(mf OTS).

Three methods of controlling the Mo were investigated and the most practicable ones are: precipitation of molybdic sulfide in the HNO_3-pitchblende digests, and decreasing concentration of Mo in the ether extracts by controlling pH, $FePO_4$ complexing, dilution, and silica removal, in the ore-HNO_3 solutions before extraction. The activated charcoal method is not practicable. (T.R.H.)

10777 UCRL-1723

California. Univ., Berkeley. Radiation Lab.

PRELIMINARY STUDIES FOR THE SEPARATION OF HD FROM H_2 BY RECTIFIED ABSORPTION. D. N. Hanson, C. d'A. Hunt, M. W. Cook, and J. L. Fick. Mar. 17, 1952. Decl. Apr. 6, 1956. 25p. Contract W-7405-eng-48. $4.80(ph OTS); $2.70(mf OTS).

The feasibility of rectified absorption for the recovery and purification of HD from H_2 streams has been investigated. The absorbent considered was liquid nitrogen. The process appears to present no major engineering or operational problems. Cost calculations indicate that the process may be economically competitive with other processes. Process design was based on an estimated separation factor between H_2 and HD in this system. Experimental work has been undertaken to check the validity of this estimate and to investigate the possibility of using other absorbents such as hydrocarbons and fluorocarbons. (auth)

10778 WAPD-PWR-CP-1717

Westinghouse Electric Corp. Bettis Plant, Pittsburgh.

STRIPPING OF TRACE AMOUNTS OF Xe^{133} FROM AQUEOUS SOLUTION. A. S. Kesten. Jan. 18, 1956. 7p. Contract AT-11-1-GEN-14. $1.80(ph OTS); $1.80(mf OTS).

The rate of O_2 removal from a water solution is about the same or greater than Xe removal in a stripping operation. Results demonstrate that gross deviations, in the rate of Xe^{133} stripping, from expected rates do not exist. (F.S.)

10779 Y-B20-81

Carbide and Carbon Chemicals Div. Y-12 Plant, Oak Ridge, Tenn.

FUNDAMENTALS CONFERENCES—DECEMBER 1948 TO SEPTEMBER 1949. F. T. Howard, [comp.]. Nov. 1950. Decl. Feb. 9, 1956. 158p. Contract W-7405-eng-26. $24.30(ph OTS); $7.50(mf OTS).

Notes from conferences on the fundamentals of the electromagnetic separation process are presented. (B.J.H.)

TRACER APPLICATIONS

Refer to abstract 10786.

TRANSURANIC ELEMENTS AND COMPOUNDS

10780 ANL-4066

Argonne National Lab., Lemont, Ill.

CHEMICAL METHODS FOR THE PURIFICATION AND ISOLATION OF NEPTUNIUM. L. B. Magnusson, J. C. Hindman, and T. J. LaChapelle. Oct. 10, 1947. Decl. Dec. 15, 1955. 33p. Contract W-31-109-eng-38. $0.30(OTS).

Methods for separating Np from various types of source material are outlined. For the purpose of analytical classification Np may be grouped with U and Pu since all three elements, mixed in an aqueous solution, can be oxidized to a characteristic +6 state. An excellent separation from other metal ions is obtained by extraction of the +6 states into diethyl ether. Methyl isobutyl ketone is also an effective extracting solvent although it is not as specific. All three elements in the +6 state will precipitate with sodium as double acetates of the formula $NaXO_2(OOCCH_3)_3$. Neptunium may be separated from U and Pu by solvent extraction or precipitation. Np(IV) forms a benzene soluble, chelate complex with thenoyl trifluoroacetone. Under suitable reducing conditions Np(IV) can be extracted away from Pu(III) and U(VI). A separation method involving the precipitation of fluorides is essentially dependent on the relative rates of oxidation and reduction of U, Np, and Pu. (auth)

10781 CN-2807

[Clinton Labs., Oak Ridge, Tenn.]

ANALYSIS OF Pu(IV) POLYMER FOR CHLORIDE IONS. Progress Report on P. A. No. CX3-2. D. G. Rose. Apr. 23, 1945. Decl. Feb. 14, 1956. 10p. Contract W-7405-eng-39. $1.80(ph OTS); $1.80(mf OTS).

Two experiments were performed in which the precipi-

tate resulting from the addition of KOH to a Pu^{4+} polymer solution was dissolved in acid and analyzed for chloride ions. In the experiment the pH of the precipitate washes previous to dissolving were measured to detect any chloride ion that was washed out. Only .03 moles Cl^- per mole of Pu^{4+} were found and this was easily washed out of the precipitate by wash water. This would indicate that the polymer unit did not include chloride ions; that the chloride was brought down during the precipitation and was at best on the surface of the polymer particles. (auth)

10782 HW-24115
[Hanford Works, Richland, Wash.]
THE MECHANISM OF CARRYING Pu(III) ON LANTHANUM FLUORIDE (thesis). Delebert Lloyd Ralphs. Apr. 15, 1952. Decl. Feb. 1, 1956. 53p. Contract [W-31-109-Eng-52].

Thesis submitted to Oregon State Coll. $9.30(ph OTS); $3.60(mf OTS).

10783 LA-1082
Los Alamos Scientific Lab., N. Mex.
COMPARISON OF DIRECT EVAPORATION AND LANTHANUM FLUORIDE METHODS FOR PLUTONIUM RADIOCHEMICAL ANALYSIS. Karl S. Bergstresser and Rebecca M. Bradford. Mar. 16, 1950. Decl. Dec. 13, 1955. 31p. $4.80(ph OTS); $2.70(mf OTS).

A comparison of two methods for the radiochemical analysis of Pu was made with analytical samples that were either simulated or actual plant control solutions. Of the two methods employed, the direct evaporation procedure involved little or no separation of Pu from other sample components, while the lanthanum fluoride procedure usually separated the Pu from all other substances in the original sample. The direct evaporation procedure was satisfactory when no more than 300 micrograms of salt or other non-volatile substances was contained in the sample that was transferred to the counting plate. The lanthanum fluoride procedure was satisfactory for samples in which the 300-microgram limit was exceeded, or for all analyses of ethylene glycol-phosphoric acid mixtures. However, the concentration of K+ in the sample should not exceed 0.05 M just before precipitation of the LaF_3. A determination of the errors due to salt absorption of alpha particles in the radiochemical analysis by the direct evaporation procedure was made for a series of sixteen salts at varying concentrations. The absorption errors generally were less than those predicted by the equation that has been proposed by Bradford, Roberts, and Wahl. For the salts that were studied, it was not possible to predict absorption errors on the basis of weight of salt in the analysis sample. (auth)

10784 N-1817
Chicago. Univ. Metallurgical Lab.
CRYSTAL STRUCTURE OF NpF_6. W. H. Zachariasen. Jan. 22, 1946. Decl. Jan. 30, 1956. 1p. (MUC-FWHZ-166). $1.80(ph OTS); $1.80(mf OTS).

A hexafluoride with UF_6-type structure is shown for a sample by x-ray diffraction. The crystal is orthorhombic with 4 molecules per cell. Lattice dimensions are: $a_1 = 9.91 \pm 0.02$A., $a_2 = 8.97 \pm 0.02$A., $a_3 = 5.21 \pm 0.02$A.; and the space group is Pnma (D_{2h}^{16}). These are the same as for UF_6. (T.R.H.)

URANIUM AND URANIUM COMPOUNDS

10785 A-2934
Yale Univ., New Haven. Sterling Chemistry Lab.
THE EXTRACTION OF URANIUM FROM PITCHBLENDE BY AMMONIUM CARBONATE. Herbert M. Clark and Ralph G. Van Name. Jan. 8, 1947. Decl. Oct. 13, 1955. 10p. $1.80(ph OTS); $1.80(mf OTS).

The experiments show that U may be extracted from pitchblende by carbonate solutions, preferably $(NH_4)_2CO_3$, in the presence of oxidizers such as O_2, H_2O_2 and Pb_3O_4. Procedures for recovery of $(NH_4)_2CO_3$ and for obtaining $UO_2(NO_3)_2$ are proposed. (T.R.H.)

10786 AECD-4007
Tennessee Eastman Corp., Oak Ridge, Tenn.
THE APPLICATION OF TRACER TECHNIQUES TO THE DETERMINATION OF URANIUM EXTRACTION COEFFICIENTS. D. A. Lee, R. W. Woodard, and G. H. Clewett. Jan. 23, 1947. Decl. Jan. 5, 1956. 9p. Contract W-7401-eng-23. (H-5.365.9). $3.30(ph OTS); $2.40(mf OTS).

The development of a method using tracer technique for determining U extraction coefficients on solutions of low U concentration is discussed. It was found that extraction coefficients could be determined on systems containing as low as one ppm U using 1900 level U as the tracer. Results of several extraction series are presented in which $Al(NO_3)_3$ is used as the salting agent and dibutyl carbitol the organic extractant. (auth)

10787 BMI-JDS-196
Battelle Memorial Inst., Columbus, Ohio.
ADSORPTION OF URANIUM FROM PHOSPHATE SOLUTIONS BY ACTIVATED CARBON. Iver Igelsrud and E. F. Stephan. June 30, 1949. Decl. Mar. 12, 1956. 45p. Contract W-38-094-eng-27. $0.30(OTS).

The work done on U adsorption from phosphate solutions from the time the initial experiments were made in May, 1948, to June 1949, is described. During this time, a total of fifty-six carbons, all but four of which were activated, have been tried under a variety of conditions on phosphate solutions ranging in U content from 15 to over 300 mg./l. and over a range of acidities up to over 40% of free H_3PO_4. The initial results, obtained on superphosphate solutions with a pH of 2.7, indicated nearly quantitative, over 90%, adsorption on a minus 200-mesh C. Efforts to confirm this with duplicates of this C and with many other carbons have been fruitless. There are some indications that, by increasing the ratio of C to U, the total adsorption might be increased from superphosphate solutions. This has not been confirmed. When the superphosphate solution was reduced with Fe filings in the presence of C, 96% of the U precipitated, but this was later brought about in the absence of C. (auth)

10788 CF-52-3-253
Oak Ridge National Lab., Tenn.
PHYSICAL PROPERTIES OF URANYL SULFATE SOLUTIONS AT ATMOSPHERIC PRESSURE. J. D. Roarty, S. I. Kaplan, W. D. Powers, and R. F. Redmond. Mar. 10, 1952. Decl. Feb. 4, 1956. 16p. Contract [W-7405-eng-26]. $3.30(ph OTS); $2.40(mf OTS).

The surface tension, viscosity, density, and heat capacity of uranyl sulfate solutions were measured in a temperature range of approximately 0 to 100°C at atmospheric pressure. Solutions of uranyl sulfate in concentrations of 100, 200, and 400 g. U/l. solution were investigated in both light and heavy water. (auth)

10789 CF-54-4-217
Oak Ridge National Lab., Tenn.
RECOVERY OF URANIUM FROM REDUCTION BOMB SLAG BY DIRECT FLUORINATION. M. R. Bennett. Apr. 30, 1954. Decl. Feb. 9, 1956. 8p. Contract [W-7405-eng-26]. $1.80(ph OTS); $1.80(mf OTS).

Results are reported of a limited program to test the feasibility of recovering U from reduction-bomb slag by direct fluorination at elevated temperature. (auth)

10790 CF-54-9-13
Oak Ridge National Lab., Tenn.
ESTIMATED TWO-LIQUID PHASE TEMPERATURES FOR

HRT SOUP. C. H. Secoy. Sept. 1, 1954. Decl. Apr. 13, 1956. 5p. Contract [W-7405-eng-26]. $1.80(ph OTS); $1.80(mf OTS).

Estimated temperatures at which a second liquid phase will appear in $UO_2SO_4-H_2SO_4-D_2O$ solutions are given in tabular and graphical form. The data cover the range from 1 to 60 g of U/kg of D_2O and from 0 to 100% excess H_2SO_4 calculated on a molal basis on the U. (auth)

10791 ISC-258

Ames Lab., Ames, Iowa.

CONTINUOUS PREPARATION OF A FINE URANIUM OXIDE SLURRY. W. R. Millard and Paul R. Crowley. June 1952. Decl. Jan. 7, 1956. 42p. Contract W-7405-eng-82. $0.30(OTS).

The current interest in circulating fuel homogeneous reactors has introduced the problem of preparing a suitable fuel for this type of reactor. A suspension of uranium oxide in either heavy or light water has been suggested as one possibility. It has been shown that uranium oxide particles suitable for suspension in water may be produced by decomposing an atomized solution of uranyl nitrate in acetone with the heat liberated by combustion of the acetone. A modification of the method is to decompose an aqueous solution of $UO_2(NO_3)_2$ by atomizing the solution into a decomposition chamber heated by burning natural gas. A further modification is the installation of a scrubbing unit to remove the uranium oxide particles from the gases leaving the decomposition chamber, thus producing a slurry directly. The scrubbing liquid may be continuously circulated through the scrubber and thereby a concentrated suspension of uranium oxide may be obtained. Equipment for producing a uranium oxide slurry using this method was designed, built, and tested. The equipment included a decomposition chamber, scrubber, recirculating system, and auxiliary equipment. (auth)

10792 K-410

Carbide and Carbon Chemicals Corp. K-25 Plant, Oak Ridge, Tenn.

THERMAL DECOMPOSITION OF THE COMPOUND URANIUM TETRAFLUORIDE–AMMONIUM FLUORIDE. H. A. Bernhardt, R. A. Gustison, and J. C. Posey. June 1, 1949. Decl. Oct. 17, 1955. 10p. Contract [W-7405-eng-26]. (KLO-104). $1.80(ph OTS); $1.80(mf OTS).

When UF_4 is precipitated from a solution containing NH_4F, the precipitate contains slightly more than one mole of NH_4F per mole of UF_4. The thermal decomposition in vacuo of this additional compound was studied over the temperature range 151 to 385°C. At a temperature of 375°C, the decomposition may be carried practically to completion in 100 minutes. From the experimental data, an equation was derived relating decomposition rate and temperature. (auth)

10793 KAPL-M-MHS-23

Knolls Atomic Power Lab., Schenectady, N. Y.

THE THERMAL CONDUCTIVITY OF UO_2 POWDER. M. H. Shackelford. Apr. 5, 1954. Supplement May 24, 1954. 11p. Contract W-31-109-Eng-52. $3.30(ph OTS); $2.40 (mf OTS).

The thermal conductivity of UO_2 powder packed to 58% of theoretical density using various gases for filling void volume and at 500, 1000, and 1500°F is reported. (T.R.H.)

10794 M-2102

Purdue Univ., Lafayette, Ind.

THE PREPARATION AND REACTIONS OF CERTAIN COMPOUNDS OF T [URANIUM]. Monthly Technical Report [for] February 1, 1945 to March 1, 1945. E. T. McBee. Mar. 21, 1945. Decl. Jan. 7, 1956. 16p. Contract W-7405-eng-74. $3.30(ph OTS); $2.40(mf OTS).

Sixty-five organic compounds were investigated for use in precipitating U compounds from dilute aqueous solutions. Arsanilic acid appeared to be the most promising of these compounds. The advantages to be obtained by the reduction of UO_2^{2+} and Fe^{+3} to U^{4+} and Fe^{+2}, respectively, before precipitation are being studied. The precipitation of U from aqueous solutions of UO_2^{2+} and other cations by ammonia followed by selective chlorination of the precipitate, leading to the preparation of UCl_4, is being studied. Vapor phase chlorination of UO_3 to UCl_4 with thionyl chloride at 350°C works very well. The same reaction is being investigated in the liquid phase. Partial conversions to UCl_4 have been obtained by fusing $U(SO_4)_2$ with certain metallic chlorides. The removal of ether peroxides from ethyl ether is 99.5% complete with 18% HNO_3. The recovery of U from carbon electrodes and electrode ash by fusion, extraction, fluorination, and chlorination is being studied. (auth)

10795 M-4231

Princeton Univ., N. J. Frick Chemical Lab.

THE MERCURY DIAPHRAGM ELECTROLYSIS CELL. N. H. Furman and Bruce McDuffie. 1946. Revised Nov. 1947. Decl. Oct. 6, 1955. 7p. $1.80(ph OTS); $1.80 (mf OTS).

It was shown by experiment that with a proper choice of media during electrolysis and with a proper oxidation-reduction buffer in the "exit" solution it is possible to separate considerable quantities of Cu, Fe and other metals from U by electrolysis of the electrolytically deposited metals through a Hg diaphragm. (auth)

10796 M-4237

Princeton Univ., N. J. Frick Chemical Lab.

BOILING POINT STUDIES ON SOLUTIONS OF URANYL NITRATE IN DIETHYL ETHER. William E. Bunce and N. H. Furman. July 31, 1945. Decl. Oct. 6, 1955. 9p. $1.80(ph OTS); $1.80(mf OTS).

10797 M-4244

Princeton Univ., N. J. Frick Chemical Lab.

THE REDUCTION OF URANYL SOLUTIONS BY SATURATED LIQUID ZINC AMALGAM. N. H. Furman, W. B. Mason, and J. S. Pekola. May 1947. Decl. Oct. 6, 1955. 10p. Contract W-7405-Eng-81. $3.30(ph OTS); $2.40 (mf OTS).

The reduction of uranyl solutions by a saturated Zn – Hg amalgam is accomplished without interference from Ni. Special apparatus, procedures, and conditions are described. (T.R.H.)

10798 MCW-102

Mallinckrodt Chemical Works, St. Louis.

A COMPARISON OF THE IRON–AMMONIA AND THE SODIUM HYDROXIDE METHODS FOR THE RECOVERY OF URANIUM FROM LAUNDRY WATER. Walter G. Weber. Aug. 5, 1948. Decl. Sept. 13, 1955. 4p. $1.80 (ph OTS); $1.80(mf OTS).

The $Fe-NH_3$ method is superior to the NaOH method, and the filtration of the $Fe-NH_3$ precipitate is faster as shown by experiment. (T.R.H.)

10799 MCW-124

Mallinckrodt Chemical Works, St. Louis.

RECOVERY OF URANIUM FROM SOAP WATER BY COPRECIPITATION WITH IRON. W. G. Weber. July 20, 1948. Decl. Sept. 13, 1955. 4p. $1.80(ph OTS); $1.80 (mf OTS).

A 99.99% recovery of U from soap water used to clean coveralls, was effected by coprecipitation with Fe^{3+}. (T.R.H.)

10800 MITG-245

Massachusetts Inst. of Tech., Watertown. Mineral Engineering Lab.

SOME PROPERTIES OF URANOUS PHOSPHATES. Topi-

cal Report. James H. Pannell and Emilia M. Rubino. Sept. 15, 1950. Decl. Jan. 25, 1956. 34p. Contract AT-30-1-gen-211. $0.25(OTS).

An investigation aimed at characterizing phosphates of tetravalent U has shown that these compounds, when formed by precipitation, are gelatinous substances of somewhat variable composition. Their solubilities and behavior on thermal decomposition have been studied in order to obtain data of value in the treatment of U ore leach solutions. (auth)

10801 MITG-248

Massachusetts Inst. of Tech., Watertown. Mineral Engineering Lab.

MISCELLANEOUS POTENTIOMETRIC STUDIES ON URANIUM BEARING SOLUTIONS. James H. Pannell, Robert J. Woody, and Julia M. Grandfield. Feb. 28, 1951. Decl. Jan. 11, 1956. 21p. Contract AT-30-1-GEN-211 and AT (49-1)-533. $0.25(OTS).

A number of oxidation reduction studies on solutions containing U and elements associated with U in nature have been made in connection with the investigation of the recovery of U from low grade ores. These studies have not been previously reported. They include: a brief investigation of the potential of the U(IV)–U(VI) couple as a function of pH, U concentration and type of anion; a study of the potential changes taking place in as-received and reduced commercial H_3PO_4 on oxidation; and an investigation leading to the development of a potentiometric method for the determination of Fe and V in commercial H_3PO_4. (auth)

10802 MITG-251

Massachusetts Inst. of Tech., Watertown, Mass. Mineral Engineering Lab.

FLUORIMETRIC DETERMINATION OF URANIUM. PART II. A RAPID METHOD FOR THE PURIFICATION OF URANIUM IN SOLUTIONS WHERE IMPURITY TO URANIUM RATIO IS HIGH. Julia M. Grandfield. Nov. 15, 1950. Decl. Dec. 22, 1952. 25p. Contract AT-30-1-GEN-211. $4.80(ph OTS); $2.70(mf OTS).

A useful procedure for the rapid determination of U in the presence of interfering elements is described. The U is batch extracted by ethyl acetate using magnesium nitrate as the salting agent. The ethyl acetate layer is either evaporated over water or pipetted directly for a final fluorimetric analysis. Solutions containing from 2 ppm to 5.0 g/l have been analyzed accurately. (auth)

10803 MITG-A60

Massachusetts Inst. of Tech., Watertown, Mass. Mineral Engineering Lab.

A MICROVOLUMETRIC METHOD FOR THE DETERMINATION OF SMALL QUANTITIES OF URANIUM. Richard H. Kennedy and David Kaufman. May 16, 1949. Decl. Apr. 11, 1956. 28p. Contract W-7405-eng-85. $0.25 (OTS).

A microvolumetric method for U is presented which is satisfactory for quantities as small as 0.1 mg of U_3O_8. This microvolumetric method has a precision and accuracy comparable with the usual macrovolumetric method. The ordinary chemical separations for the removal of interferences are employed although certain refinements have been added. After the removal of interfering elements the U is reduced in a micro-Jones reductor and titrated with ceric sulfate using Ferroin as an indicator. Gilmont ultramicroburettes of 1.0 ml capacity are employed for the addition of ceric sulfate and indicator, and are the only special pieces of apparatus required. Complete procedures for the analyses of ores and ore products are given. (auth)

Refer also to abstract 10772

WASTE DISPOSAL

10804 KAPL-M-FNS-3

[Knolls Atomic Power Lab., Schenectady, N. Y.]

A SURVEY OF THE LIQUID WASTE STORAGE FACILITIES AT KAPL WITH RESPECT TO COSTS AND FUTURE REQUIREMENTS. J. D. Evans and F. N. Schell. Nov. 28, 1951. Decl. Feb. 8, 1956. 14p. Contract W-31-109-Eng-52. $3.30(ph OTS); $2.40(mf OTS).

ENGINEERING

10805 CF-52-8-140

[Oak Ridge National Lab., Tenn.]

PRESSURE VESSEL WINDOWS FOR USE AT HIGH PRESSURES. C. C. Heisig. Aug. 6, 1952. 10p. Contract [W-7405-eng-26]. $1.80(ph OTS); $1.80(mf OTS).

A brief description is given of most of the types of windows that have been used at high pressure, and comments by the designers on their utility are included. (F.S.)

10806 CF-53-7-198

Oak Ridge National Lab., Tenn.

PRESSURE DROP ACROSS WIRE MESH PACKING. R. H. Wilson. July 30, 1953. 7p. Contract [W-7405-eng-26]. $1.80(ph OTS); $1.80(mf OTS).

An analysis was made of the pressure drop across wire mesh for packed columns. (F.S.)

10807 CF-53-10-198

Oak Ridge National Lab., Tenn.

MAXIMUM OUTPUTS EXPECTED FROM TURBOGENERATORS OPERATING ON LOW PRESSURE STEAM. J. D. Maloney. Oct. 22, 1953. 8p. Contract [W-7405-eng-26]. $1.80(ph OTS); $1.80(mf OTS).

The maximum ratings for 1800 and 3600 rpm turbogenerators operating on 215 psia steam are investigated. (D.E.B.)

10808 CF-55-4-34

Oak Ridge National Lab., Tenn.

EMPIRICAL CORRELATION FOR FATIGUE STRESSES. A. S. Thompson. Apr. 5, 1955. 6p. Contract W-7405-eng-26. $1.80(ph OTS); $1.80(mf OTS).

Tentative presentation is made of a correlation by which better use of existing experimental fatigue data can be made for predicting the performance of structural materials in regions where no data exist. The correlation would be useful in utilizing data from fatigue failures under cyclic loading in the range of 10^{10} cycles for designs to be used in the range of 0.5 to 10^3 cycles. (T.R.H.)

10809 CF-55-10-119

Oak Ridge National Lab., Tenn.

UNDERFLOW SAMPLER. W. D. Burch. Oct. 13, 1955. 8p. Contract [W-7405-eng-26]. $1.80(ph OTS); $1.80 (mf OTS).

Modification of the high activity level, remotely operated sampler used in the HRT for sampling the chem plant underflow pot is discussed. (T.R.H.)

10810 KAPL-M-GH-14

Knolls Atomic Power Lab., Schenectady, N. Y.

STRESSES AND DEFORMATION OF FLANGED SHELLS. G. Horvay and I. M. Clausen. Oct. 21, 1952. 74p. Contract W-31-109-Eng-52. $12.30(ph OTS); $4.50(mf OTS).

Shell bending formulas, except those for cylindrical shells, do not seem to be available in a suitable form to be used in design without considerable labor. The following formulas for axisymmetric loading of axisymmetric shells

are provided: membrane formulas for weight, gas pressure, liquid pressure, and temperature loadings (of conical and spherical shells), zeroth approximation bending formulas for arbitrary thin-walled shells; first approximation bending formulas for spherical and conical shells; flange deformation and stress formulas; and flange and shell interaction formulas. (auth)

HEAT TRANSFER AND FLUID FLOW

10811 CE-3503
[Chicago. Univ.] Metallurgical Lab.
FALLING FILM HEAT EXCHANGER. Byron A. Kress. May 30, 1945. Decl. Feb. 14, 1956. 21p. Contract W-7401-eng-37. $4.80(ph OTS); $2.70(mf OTS).

In order to determine the possibilities of using a falling film heat exchanger in a homogeneous reactor, the optimum size of a falling film tube with regard to heat transfer and hold-up and an investigation of the possibility of gas release by the film were studied. An apparatus was designed and built which would give rates of flow for various types of inlets in gravity-flow and in forced flow falling film. Some heat removal calculations were made. (F.S.)

10812 CF-52-4-37
Oak Ridge National Lab., Tenn.
EXPERIMENTAL HEAT TRANSFER COEFFICIENTS FOR MOLTEN SODIUM HYDROXIDE. H. W. Hoffman. Apr. 2, 1952. 10p. Contract [W-7405-eng-26]. $1.80(ph OTS); $1.80(mf OTS).

An experimental determination of the heat transfer coefficients for molten NaOH flowing in forced convection was made with the aid of a heated tube system. Heat transfer coefficients in the Reynolds modulus range of 8500 to 12,000 are reported. Results show that molten NaOH may be considered an ordinary fluid—i.e., any fluid other than the liquid metals—as far as heat transfer is concerned. (auth)

10813 CF-54-3-67
Oak Ridge National Lab., Tenn.
ESTIMATED TREND OF THERMAL EFFICIENCY AND REAL COST OF STEAM POWER STATIONS FOR THE NEXT 50 YEARS. J. D. Maloney. Mar. 11, 1954. 15p. Contract [W-7405-eng-26]. $3.30(ph OTS); $2.40(mf OTS).

Future power demand and fuel cost trends are extrapolated and used to predict thermal efficiency and real cost of power stations for the next 50 years. (T.R.H.)

10814 CF-55-4-124
Oak Ridge National Lab., Tenn.
FLEXIBLE MOUNTING SYSTEMS. A. S. Thompson. Apr. 11, 1955. 7p. Contract W-7405-eng-26. $1.80 (ph OTS); $1.80(mf OTS).

Design requirements for mounting systems for heavy equipment are calculated. These systems are potentially useful for mounting high temperature heat exchangers, etc., which are fastened by piping to stationary objects so that the loads in the piping system do not overload any part of the system. (T.R.H.)

10815 CF-55-10-34
Oak Ridge National Lab., Tenn.
THE CALCULATION OF COOLANT CIRCUITS FOR TURBULENT FLOW CONDITIONS. William R. Smith. Nov. 1, 1955. 25p. Contract [W-7405-eng-26]. $4.80 (ph OTS); $2.70(mf OTS).

The necessary materials for calculations of coolant circuits fabricated by brazing flattened tubing to the surface to be cooled are presented in a usable form along with all necessary curves and equations. Several specialized equations which simplify the calculations are included and sample calculations made. (T.R.H.)

10816 KAPL-M-GH-9
Knolls Atomic Power Lab., Schenectady, N. Y.
THERMAL STRESSES IN LONG, THIN-WALLED CYLINDERS. C. Horvay and B. J. Montague. Oct. 17, 1951. 20p. Contract W-31-109-Eng-52. $3.30(ph OTS); $2.40 (mf OTS).

A family of curves was prepared which give the stresses and deformation in thin-walled cylinders when a sinusoidal temperature drop occurs in the cylinder. (D.E.B.)

10817 KAPL-M-GHE-1
Knolls Atomic Power Lab., Schenectady, N. Y.
REPORT OF LITERATURE SURVEY ON LIQUID-GAS ENTRAINMENT PROBLEMS. Gilbert H. Epstein. July 7, 1955. 16p. Contract W-31-109-Eng-52. $3.30(ph OTS); $2.40(mf OTS).

An exploratory study has been made of literature pertaining to the phenomena of interfacial particles in gas-liquid systems to learn what factors influence the behavior of bubbles or other types of entrainment in both static and dynamic two-phase systems. The aim is ultimately to apply these findings and their corollaries to problems associated with filling and draining Na systems, where gas entrainment appears undesirable, both from heat transfer and hydraulic considerations. (auth)

10818 KAPL-M-RGK-11
Knolls Atomic Power Lab., Schenectady, N. Y.
NATURAL CONVECTION FLOW AND HEAT TRANSFER IN POROUS MEDIA. R. G. Kennison. Jan. 14, 1953. 13p. Contract W-31-109-Eng-52. $3.30(ph OTS); $2.40(mf OTS).

An analysis is made of the heat transferred by natural convection flow in porous media. This is applied to predict the change in thermal conductivity in the upper half of the SIR rotating reloading plugs. It is found that the conductivity is increased by about a factor of five. (auth)

10819 KAPL-M-RGK-14
Knolls Atomic Power Lab., Schenectady, N. Y.
FLOW LOSS COEFFICIENTS IN SMALL CONICAL MOUTH ORIFICES. R. G. Kennison and P. R. Matthews. [1953?]. 22p. Contract W-31-109-Eng-52. $4.80(ph OTS); $2.70 (mf OTS).

Flow loss coefficients for small conical mouth orifices are presented as a function of orifice throat diameter. A tentative correlation of the results is presented as, $\Delta P = K\nu^{1.59}/zg$ where ΔP = contraction loss, ν = orifice throat velocity, and K = loss coefficient as a function of throat diameter. The behavior of the boundary layer in a conical convergence is also considered and a possible partial explanation of the test results is presented. (auth)

10820 KAPL-M-RJF-6
Knolls Atomic Power Lab., Schenectady, N. Y.
METHOD OF CALCULATION OF TEMPERATURE TRANSIENTS IN A SOLID. R. J. Fritz. Mar. 18, 1952. 10p. Contract W-31-109-Eng-52. $1.80(ph OTS); $1.80(mf OTS).

A method is given for determining the temperature distribution in a homogeneous solid due to an arbitrary temperature transient where the geometry is semi-infinite, the heat flow is one dimensional, and the initial temperature distribution is uniform. (auth)

MATERIALS TESTING

10821 KAPL-877
Knolls Atomic Power Lab., Schenectady, N. Y.
SUMMARY OF JOURNAL BEARING TESTS WITH COPPER BEARINGS AND TUNGSTEN CARBIDE JOURNALS OPERATING IN SODIUM–POTASSIUM ALLOY. D. B. Vail.

Feb. 3, 1953. Decl. Jan. 10, 1956. 27p. Contract W-31-109-Eng-52. $4.80(ph OTS); $2.70(mf OTS).

Tests were performed on two 2⅜-inch-diameter hydrodynamic journal bearings with sodium-potassium alloy as a lubricant. The first test was made with an electrolytically copper-plated bearing and 18-4-1 high speed, tool-steel guide bearings operated against a tungsten carbide journal. The second test was run with an electrolytically copper-plated bearing and tough pitch copper guide bearings operated against a tungsten carbide journal. Tests were run with speeds of 1200 and 1700 rpm and with liquid metal temperatures from 100 to 500°F. The duration of the respective tests was 376 hours and 1483 hours. Data are tabulated. (auth)

10822 KAPL-M-HLT-1
Knolls Atomic Power Lab., Schenectady, N. Y.
WEAR AND GALLING TESTS OF PLUG SEAL TUBING. Report No. 1. E. G. Brush and H. L. Tymchyn. Feb. 25, 1954. 16p. Sub-Project No. 27. Contract W-31-109-Eng-52. $3.30(ph OTS); $2.40(mf OTS).

To determine the effect of Cr plating on the wear and galling characteristics of the plug seal tubing laboratory tests simulating the sliding action of the rotating plug during raising and lowering operations have been completed in Na at 500°F. Cr plated and as drawn tubing sections, loaded to deflections of 15 and 30 mils, were drawn over plates representing the container wall under conditions simulating 355 plug raising and lowering operations. Results indicate that seizing due to galling is unlikely in SIR and that for deflections in the range of 0 to 20 mils as drawn tubing has satisfactory resistance to wear and scoring. Above 20 mil deflections Cr plating will reduce the amount of scoring and wear experienced by both tubing and container wall. (auth)

10823 KAPL-M-PMC-1
Knolls Atomic Power Lab., Schenectady, N. Y.
FREEZE SEALS. P. M. Clark. July 14, 1952. 6p. Contract W-31-109-Eng-52. $1.80(ph OTS); $1.80(mf OTS).

Results are presented from tests on an air-cooled freeze seal suitable for use in the Submarine Thermal Reactor service lines. The seal consists of a finned pipe section for freezing the sodium and a trap for retaining sufficient sodium in the seal for freezing. The seal is considered a one way freeze seal because it will pass gas in one direction only without emptying the liquid from the seal. The test arrangement is illustrated and performance data are summarized. (C.H.)

PUMPS

10824 HW-29364
Hanford Atomic Products Operation, Richland, Wash.
SLURRY PUMP FOR WASTE METAL REMOVAL FROM UNDERGROUND STORAGE IN THE 200 AREAS. Final Report. Gardner L. Locke. Sept. 16, 1953. Decl. Feb. 2, 1956. 10p. Contract [W-31-109-eng-52]. $1.80(ph OTS); $1.80(mf OTS).

Present status of construction, cost information, recommendations as to the disposition of the pump, a résumé of the history of the project, and some design notes on the slurry pump are included. (T.R.H.)

10825 KAPL-M-SCT-5(Rev. 1)
Knolls Atomic Power Lab., Schenectady, N. Y.
CALIBRATION OF 8" MAGNETIC FLOWMETER BY USE OF A CALIBRATED ORIFICE. E. J. Duffy and J. J. Marguin. May 24, 1955. 34p. Contract W-31-109-Eng-52. $6.30(ph OTS); $3.00(mf OTS).

A calibrated, sharp-edged orifice was installed and used for the calibration of the Mark I-1 eight-inch magnetic flowmeter. This flowmeter is one of the two being used for performance testing of Mark B electromagnetic pumps, both prototype and production models. Repeatable data was obtained throughout the entire calibration period of eleven days. As a result, it is now possible to establish the relationship between this magnetic flowmeter output signal and sodium flow which, to date, has been in question. From the test it is now certain that the relationship between flowmeter output and flow does deviate from linearity above the higher flow rates (1800 gpm and over). Pump performance, based on flow measurements derived from magnetic flowmeters, has been affected to such an extent that, because of this deviation, it has not been possible to establish the rated voltage or accurate performance curves on the electromagnetic pumps. (auth)

VACUUM SYSTEMS

10826 NNES-I-1(Chap. 6)
California. Univ., Berkeley. Radiation Lab.
VACUUM EQUIPMENT AND TECHNIQUES. CHAPTER 6. OPERATIONAL TECHNIQUES. W. E. Bush. Apr. 1952. Decl. Apr. 11, 1956. 33p. Contract W-7405-eng-48. (BP-45). $0.25(OTS).

The operation of high-vacuum systems, such as those associated with calutrons, is discussed. Supplementary heating and cooling, outgassing, gas sources, and trouble-shooting are also discussed. (T.R.H.)

WASTE DISPOSAL

10827 CF-55-3-128
Oak Ridge National Lab., Tenn.
EVALUATION OF THE WATERTIGHTNESS OF AN ASPHALT, TAMPED-CLAY PIT LINER. K. E. Cowser, R. J. Morton, and T. W. Bendixen. Mar. 23, 1955. 25p. Contract [W-7405-eng-26]. $4.80(ph OTS); $2.70(mf OTS).

The construction of an asphalt-lined pit for testing its practicality for disposal of high-level, processed, liquid, radioactive wastes is described. Final results indicated losses of up to 22 gal. per day which were attributed to non-uniformity of asphalt liner thickness and tamped shale puncturing. (T.R.H.)

MINERALOGY, METALLURGY, AND CERAMICS

CERAMICS AND REFRACTORIES

10828 KAPL-M-EEB-11
Knolls Atomic Power Lab., Schenectady, N. Y.
EVALUATION OF NORTON NON-METALLIC BONDED BORON CARBIDE COMPACTS. E. E. Baldwin, G. L. Cutler, and F. W. Wiesinger. Oct. 28, 1954. 17p. Contract W-31-109-Eng-52. $3.30(ph OTS); $2.40(mf OTS).

Physical and mechanical properties were determined, and simulated thermal service tests were run on boron carbide compacts bonded with several non-metallic binders. Non-metallic bonding of boron carbide for SIR shield cans offers no advantage over vibrating mix grade boron carbide, since the binders are not stable in Na and the properties of the compacts were no better than vibrating mix. (auth)

10829 SC-3674(TR)
Brush Labs. Co., Cleveland.
PIEZOELECTRIC PROPERTIES OF BARIUM TITANATE

CERAMICS OVER A WIDE TEMPERATURE RANGE. Don A. Berlincourt. Mar. 17, 1955. 23p. For Sandia Corp. Contract [AT(29-1)-789] Sub Contract WC-727. $4.80(ph OTS); $2.70(mf OTS).

This report is a review of the work done on barium titanate and its compositional variations. The planar coupling coefficient, the dielectric constant, and the elastic compliance have been determined for several compositions over the temperature range from −70° to +75°C. The pyroelectric effect was also investigated. (auth)

CORROSION

10830 AECD-3923

Phillips Petroleum Co. Atomic Energy Div. Idaho Falls, Idaho.

CORROSION OF ALUMINUM AND BERYLLIUM BY MTR CANAL WATER. J. B. Burnham, Jr. and M. H. Bartz. Jan. 14, 1953. Decl. with deletions Jan. 5, 1956. 12p. $3.30(ph OTS); $2.40(mf OTS).

In order to control the excessive corrosion of Be and Al encountered in early operation of the MTR canal a corrosion testing program was initiated. In a series of beaker tests the effects of adding inhibitors and varying the pH of the raw water were investigated. Sodium dichromate and $NaNO_3$ were both effective as corrosion inhibitors. The corrosion resistance of Al to raw water improved as the pH was reduced from 8.1 to 6.0. Adjustment of the pH with HNO_3 rather than H_2SO_4 proved much more effective in reducing corrosion rates. Aluminum showed good corrosion properties in demineralized water in the pH range of 8.1 to 6.0; the corrosion resistance was superior, though, in the lower pH water. A recommendation was made to use demineralized water of pH 7.0 in the canal. Aluminum and Be samples tested for 6 months in this water showed good corrosion resistance. (auth)

10831 AECD-4073

[Tennessee Eastman Corp., Oak Ridge, Tenn.]

REPORT ON NATIONAL BUREAU OF STANDARDS CERAMIC COATINGS ON INCONEL AND STAINLESS STEEL. R. E. Tate. July 2, 1945. Decl. Jan. 10, 1956. 13p. (JRC-33). $3.30(ph OTS); $2.40(mf OTS).

Three types of coatings were tested in the alpha sublimation still and exposed to the ion beam of the M unit. It was found that these applications are too rigorous. (T.R.H.)

10832 CF-55-6-24

Oak Ridge National Lab., Y-12 Area, Tenn.

EXAMINATION OF INCONEL-316 STAINLESS STEEL–SODIUM PUMP LOOPS 4689-5 AND 4689-6. G. M. Adamson and R. S. Crouse. June 2, 1955. Decl. Apr. 4, 1956. 12p. Contract W-7405-eng-26. $3.30(ph OTS); $2.40(mf OTS).

The findings of a metallographic examination of the loops confirm the fact that excessive mass transfer occurs in Inconel pump loops in which Na is circulated at 1500°F. The use of 316 stainless steel in the cold leg of the loops does not appear to increase mass transfer. (T.R.H.)

10833 HW-31405

Hanford Atomic Products Operation, Richland, Wash.

FOUR AND ONE-HALF MONTH CORROSION TESTS OF SPRING STEEL WIRE IN SIMULATED NEUTRALIZED PUREX PROCESS WASTE SOLUTION. N. Endow. Apr. 12, 1954. Decl. Feb. 1, 1956. 10p. Contract [W-31-109-Eng-52]. $1.80(ph OTS); $1.80(mf OTS).

Corrosion rates of 1×10^{-5} to 4×10^{-5} inch/min. were obtained for steel wire exposed to Purex waste solutions at 230°F. There was no measurable decrease in the tensile properties and no cracks were noted in the tested specimens. (C.W.H.)

10834 HW-32428

Hanford Atomic Products Operation, Richland, Wash.

EXPOSURE OF SEVERAL DIFFERENT RUBBER COMPOUNDS TO PILE WATER. IRRADIATION SERVICE REQUEST HAPO-104. Final Report [on] PT 105-505-SI, Supplement A. J. P. Cooke. Sept. 9, 1954. Decl. Feb. 20, 1956. 13p. Contract [W-31-109-Eng-52]. $3.30(ph OTS); $2.40(mf OTS).

A series of tests was made to evaluate the deterioration rates of various elastomers in active contact with pile effluent. The most promising compounds for use in γ fields and in pile effluents are listed. (B.J.H.)

10835 KAPL-M-EGB-14

Knolls Atomic Power Lab., Schenectady, N. Y.

RESISTANCE OF TITANIUM CARBIDE BEARING MATERIALS TO CORROSION IN SODIUM. Report No. 5 [on] EVALUATION OF THE BEHAVIOR OF VARIOUS MATERIALS IN SODIUM. (Problem No. 21). E. G. Brush. Apr. 15, 1953. 6p. Contract W-31-109-Eng-52. $1.80 (ph OTS); $1.80(mf OTS).

The corrosion resistance of four titanium carbide ceramals was determined in Na at 500°C and was found to be of the same order of magnitude as Carboloy 55A and 779 (tungsten carbides). (auth)

10836 KAPL-M-EGB-17

Knolls Atomic Power Lab., Schenectady, N. Y.

CORROSION RESISTANCE OF FERRITIC AND AUSTENITIC STEELS IN LITHIUM AT 500°C. Report No. 1. E. G. Brush. Apr. 8, 1954. 10p. Sub-Project No. 26: EVALUATION OF MATERIALS IN LITHIUM. Contract W-31-109-Eng-52. $1.80(ph OTS); $1.80(mf OTS).

An investigation of the corrosive properties of Li was started as a result of the interest in Li^7 as a reactor coolant-moderator. Initial tests have been performed in static and in rotating specimen apparatus with filtered Li at 500°C. The results indicate that the ferritic and austenitic stainless steels are much less resistant to corrosion in Li than in filtered Na at 500°C. This may be the result of inadequate purification or contamination of the Li during testing. (auth)

10837 NAA-SR-Memo-26

North American Aviation, Inc., Downey, Calif.

CORROSION OF TYPE 2S ALUMINUM IN DISTILLED WATER. G. M. Inman and J. J. Shyne. Apr. 10, 1951. Decl. Apr. 13, 1956. 15p. Contract AT-11-1-gen-8. $3.30(ph OTS); $2.40(mf OTS).

Corrosion of 2S aluminum in contact with distilled H_2O at room temperature presented an unexpected and serious problem during experiments with an exponential assembly. Effective coatings were developed for the Al tubing surfaces affected, which could provide protection against corrosion up to at least 80°C. The coatings have safely low neutron absorption cross sections. The probable mechanism of corrosion is briefly discussed. (auth)

Refer also to abstract 10985.

GEOLOGY AND MINERALOGY

10838 MITG-203

Massachusetts Inst. of Tech., Watertown, Mass. Mineral Engineering Lab.

THE MINERALOGY AND DISTRIBUTION OF RADIOACTIVITY IN AUSTRALIAN ZIRCON. D'Arcy R. George. May 19, 1948. Changed from OFFICIAL USE ONLY Mar.

14, 1956. 3p. Contract AT-30-1-gen-211. $1.80(ph OTS); $1.80(mf OTS).

Sixty to seventy % of the radioactivity in the sample of Australian zircon is derived from the zircon which contains about 0.13% ThO_2. The remainder is derived from monazite which contains an estimated 4 to 8% ThO_2. Production of Th concentrates containing in excess of about 0.2% ThO_2 will, therefore, depend upon recovering the monazite rather than the zircon. This will preclude a recovery in excess of 30 to 40% of the total radioactivity. If a recovery of this order is economical, the monazite can be readily separated by screening or possibly by classifying the sands at about 150 mesh and magnetically fractionating the minus 150 mesh material. (auth)

METALS AND METALLURGY

10839 BBC-43
Brush Beryllium Co., Cleveland.
HIGH DENSITY INCLUSIONS IN SINTERED SHAPES. Progress Report for the Period September 1948 to February 1949. C. G. Hoffman. Mar. 11, 1949. Decl. Feb. 7, 1956. 21p. $4.80(ph OTS); $2.70(mf OTS).

Radiographically dense inclusions were found in two of ten sintered Be shapes. Metallographic evidence indicates that these inclusions were probably complex carbides, the composition of which has not been ascertained at this time. However, radiographic and metallographic study has shown that other contaminants, in proper distribution, might cause similar indications on a radiograph. Some of these substances are; nickel, iron, beryllium carbide (formed from any of several carbonaceous materials), tungsten carbide and at least one other metal or alloy as yet unidentified. (auth)

10840 BMI-JDS-136
Battelle Memorial Inst., Columbus, Ohio.
VANADIUM IN STEELMAKING, PRESENT AND FUTURE. Survey Report. Hugo E. Johnson. Aug. 6, 1948. Changed from OFFICIAL USE ONLY Mar. 5, 1956. 57p. Contract AT-30-1-Gen-258. $0.40(OTS).

A survey was made of the possible future consumption of V in the steel industry if a price reduction could be attained. The sources, domestic and foreign, of V were reviewed, and the production, applications and present prices were surveyed. (F.S.)

10841 CF-51-7-116
Oak Ridge National Lab., Tenn.
TUBE FLARING TOOL. D. M. Paige. July 23, 1951. 11p. Contract [W-7405-eng-26]. $3.30(ph OTS); $2.40 (mf OTS).

A hydraulic tool was developed for flaring stainless steel process pipes to avoid leaking. Good flares were made using the tool. It does not depend on the worker's skill to as great an extent as previously employed methods. (F.S.)

10842 CF-52-11-121
Oak Ridge National Lab., Tenn.
REPORT ON RESULTS OF IMPACT TESTS PERFORMED ON Ti 75A AND ON IODIDE TITANIUM SPECIMENS. W. J. Fretague. Nov. 17, 1952. Decl. Feb. 7, 1956. 5p. Contract [W-7405-eng-26]. $1.80(ph OTS); $1.80(mf OTS).

Impact tests were performed on four modified Izod type impact specimens of commercial Ti and on iodide titanium specimens. (W.L.H.)

10843 CF-55-8-170
Oak Ridge National Lab., Tenn.
OBSERVATIONS ON THE BEHAVIOR OF A PRESSED THORIUM AMALGAM COMPACT DURING THE RETORTING CYCLE. E. S. Bomar. Aug. 31, 1955. Decl. Apr. 4, 1956. 9p. Contract W-7405-eng-26. $1.80(ph OTS); $1.80(mf OTS).

The retorting of cold-pressed compacts prepared from a Th amalgam resulted in a variety of textures for the retorted samples. Direct observations were thus made of a sample during the entire retorting cycle in order to determine the origin of the various defects. (B.J.H.)

10844 FMPC-164(Rev. 1)
National Lead Co. of Ohio, Cincinnati.
STANDARD OPERATING PROCEDURE FOR THORIUM CHIP PROCESSING. (Section 2.5.3.8, Revised Edition). E. W. Mautz, O. R. Magoteaux, P. Kleinsmith, and W. B. Clymer. Jan. 28, 1954. Decl. Dec. 8, 1955. 9p. Contract AT(30-1)-1156. $0.15(OTS).

10845 KAPL-M-DWW-3
Knolls Atomic Power Lab., Schenectady, N. Y.
PREPARATION AND FABRICATION OF MANGANESE–NICKEL ALLOY BRAZING WIRE. D. W. White, R. V. Gray, C. J. Beck, and A. P. Beard. Feb. 1954. 5p. Contract W-31-109-Eng-52. $1.80(ph OTS); $1.80(mf OTS).

10846 KAPL-M-EEB-7
Knolls Atomic Power Lab., Schenectady, N. Y.
THE THERMAL EXPANSION AND ELEVATED TEMPERATURE MECHANICAL STRENGTH OF HAFNIUM. Report No. 1 on INVESTIGATION OF MECHANICAL PROPERTIES OF MATERIALS. Sub-Project No. 7. E. E. Baldwin. Jan. 4, 1954. 13p. Contract W-31-109-Eng-52. $3.30 (ph OTS); $2.40(mf OTS).

Dimensional stability, thermal expansion up to 1800°F, short-time tensile at 1500°F, and stress-rupture in Na at 1200°F tests were made of arc-melted and extruded Hf. It was found that the short-time tensile strength was similar to that of Type 347 stainless steel, but the 1200°F rupture strength and coefficient of linear expansion were about one-third those of Type 347 stainless steel. (auth)

10847 KAPL-M-EEB-12
Knolls Atomic Power Lab., Schenectady, N. Y.
MECHANICAL TESTS OF A ZIRCONIUM + 2.2 PER CENT BORON POWDER METAL ALLOY. E. E. Baldwin and F. W. Wiesinger. June 7, 1955. 13p. Contract W-31-109-Eng-52. $3.30(ph OTS); $2.40(mf OTS).

Simple bend tests and hardness measurements have been made on 4 samples of a Zr–B system, heat treated by different methods. Results show this alloy has good strength, but very poor ductility and that the most favorable strength and ductility of Zr–B alloys was produced by annealing in a vacuum at 750°C. (W.L.H.)

10848 KAPL-M-EGB-2
Knolls Atomic Power Lab., Schenectady, N. Y.
DETERMINATION OF ANTI-GALLING TECHNIQUES FOR AUSTENITIC STAINLESS STEELS. E. G. Brush. May 15, 1952. 4p. Contract W-31-109-Eng-52. $1.80(ph OTS); $1.80(mf OTS).

In order to determine the effectiveness of an anti-galling compound, several one-inch stainless steel bolt-sleeve-nut assemblies were coated with platinum oxide, tightened to 250 lb-ft torque and immersed in sodium at 500°C for one month. The average loosening torque at the conclusion of the test was higher than that required for untreated bolts so that the compound was apparently of no benefit in reducing the tendency of type 347 stainless bolts to gall. (auth)

10849 KAPL-M-FWW-1
Knolls Atomic Power Lab., Schenectady, N. Y.
THE STRESS-RUPTURE STRENGTH OF ZIRCONIUM-BASE ALLOYS IN SODIUM AT 1000°F (538°C). E. E. Baldwin and F. W. Weisinger. Oct. 14, 1954. 26p. Con-

tract W-31-109-Eng-52. $4.80(ph OTS); $2.70(mf OTS).

Stress rupture tests were conducted in Na at 1000°F (530°C) on Zr-base binary and ternary alloys. The test results indicated that the alloys had rupture strengths higher than Zr but lower than type 347 stainless steel, and that the highest rupture strength was exhibited by an alloy containing 1.7% Al. (auth)

10850 KAPL-M-FWW-2
Knolls Atomic Power Lab., Schenectady, N. Y.
TENSILE, IMPACT, AND COMPRESSIVE TESTS OF WELDED MOLYBDENUM TUBING. F. W. Weisinger and E. E. Baldwin. Oct. 20, 1954. 17p. Contract W-31-109-Eng-52. $3.30(ph OTS); $2.40(mf OTS).

An investigation was carried out to determine the mechanical properties, including tensile, compressive, and impact strengths, of seam-welded Mo tubing. All tests were conducted at room temperature with additional compression tests at elevated temperatures. The results indicate that although elevated temperature increases ductility, the weld has low tensile strength, ductility, and impact strength at room temperature. (auth)

10851 KAPL-M-JMC-2
Knolls Atomic Power Lab., Schenectady, N. Y.
TITANIUM–BORON SYSTEMS: A LITERATURE SURVEY. Janet M. Cisar. Aug. 15, 1955. 22p. Contract W-31-109-Eng-52. $4.80(ph OTS); $2.70(mf OTS).

10852 KAPL-M-LLW-4
Knolls Atomic Power Lab., Schenectady, N. Y.
EXPANSION CHARACTERISTICS OF TYPE-347 ARCOS WELD. L. L. Wyman and J. E. Farrell. July 14, 1952. 6p. Contract W-31-109-Eng-52. $1.80(ph OTS); $1.80 (mf OTS).

10853 KAPL-M-LMO-1
Knolls Atomic Power Lab., Schenectady, N. Y.
X-RAY DIFFRACTION STUDY OF TYPE 347 ARCRODS ELECTRODES OF THE A-C/D-C AND D-C CLASS. L. M. Osika and W. L. Fleischmann. [nd]. 7p. Contract W-31-109-Eng-52. $1.80(ph OTS); $1.80(mf OTS).

It is concluded that the presence of $CaSiO_3 \cdot H_2O$ in lime-titania, a-c/d-c class, Arcrods type 347 electrodes may well be responsible for the tendency to cracking in welds of austenitic alloy containing 5 to 10% ferrite. The bound water in $CaSiO_3 \cdot H_2O$ is released only at 1000°C. (T.R.H.)

10854 KAPL-M-RCD-25
Knolls Atomic Power Lab., Schenectady, N. Y.
EVALUATION OF WELDED MOLYBDENUM TUBING. C. V. Donnelly and R. G. Townsend. Nov. 19, 1954. 19p. Contract W-31-109-Eng-52. $3.30(ph OTS); $2.40(mf OTS).

An investigation was made of the physical properties of four welded molybdenum tubes. A preliminary literature survey indicated that Mo welds are extremely brittle. Tests are described from which it was concluded that Mo tubing does not appear to have sufficient strength to assure manufacturing feasibility. (C.H.)

10855 KAPL-M-RLM-1
Knolls Atomic Power Lab., Schenectady, N. Y.
INVESTIGATION OF LOW DUCTILITY OF NICKEL–MANGANESE BRAZING WIRE. Richard L. Mehan. Feb. 11, 1953. 12p. Contract W-31-109-Eng-52. $3.30(ph OTS); $2.40(mf OTS).

The reason for the lack of ductility of Ni–Mn brazing wire was studied by various laboratory techniques. It was concluded that the low ductility could be attributed to low annealing temperatures. When annealed at 900°C the wire exhibited satisfactory ductility. The annealing atmosphere was found to have an important effect on ductility and the use of a dry hydrogen atmosphere was recommended. (auth)

10856 KAPL-M-WDV-2
Knolls Atomic Power Lab., Schenectady, N. Y.
TENSILE PROPERTIES OF STAINLESS STEEL, ZIRCONIUM AND TITANIUM ALLOYED WITH BORON. R. D. Hildebrand and W. D. Valovage. Dec. 7, 1955. 17p. Contract W-31-109-Eng-52. $3.30(ph OTS); $2.40(mf OTS).

Room temperature bend and tensile tests of stainless steel, Zr, and Ti alloyed with B were made to determine strength and ductility. $\sigma-\epsilon$ curves calculated from bend data were compared with tensile data. At low boron contents, the ductility of all three types of alloys is about the same. Stainless steel and titanium with about 1% B have better ductility than Zr–B alloys in this range. Titanium alloyed with B has better average tensile properties than B–stainless steel and B–Zr alloys. (auth)

10857 KAPL-M-WLF-3
Knolls Atomic Power Lab., Schenectady, N. Y.
SUMMARY OF THE RESULTS OF KAPL'S SLOW BEND FATIGUE TEST. W. L. Fleischmann. Feb. 11, 1953. 28p. Contract W-31-109-Eng-52. $4.80(ph OTS); $2.70 (mf OTS).

Structural parts of liquid metal-cooled nuclear reactors may under certain operating conditions be subjected to temperature transients. A bending fatigue test was designed to simulate stress conditions occurring in the outer fibers of parts during the temperature swing. Specimens of Type 347 stainless steel withstood the cyclic application of a high strain (0.5%) for at least 5000 cycles up to 1200°F. The plot, strain versus log number of cycles to failure, appears to give a straight line. A new rectangular test specimen is proposed to investigate effect of biaxiality on fatigue life. (auth)

10858 NAA-SR-Memo-112
North American Aviation, Inc., [Downey, Calif.]
CORRELATION OF CREEP PROPERTIES BY A DIFFUSION ANALOGY. Leon Green, Jr. Jan. 15, 1952. 26p. Contract AT-11-1-gen-8. $6.30(ph OTS); $3.00(mf OTS).

The necessity of atom movements for both creep and self-diffusion suggests a method of correlating the constant-stress creep properties of pure metals. The concept of steady-state creep is discarded, and two empirical approximations for the strain-time behavior of pure polycrystalline metals lead to a creep equation defining an activation energy as the only undetermined constant. For cases where the orientation of individual crystals is important, a second constant is required. Application of this equation to published creep data effects a correlation which indicates that the apparent activation energies observed for creep and self-diffusion show a similar temperature dependence. The effect of stress upon the activation energy for several metals is approximately described, but the need for further experiments encompassing lower values of stress is revealed. The qualitative effects of impurities, grain size, cold working, and surface conditions upon creep as predicted by a diffusion analogy are found to be in agreement with experimental results, but it is noted that the analogy does not hold if creep deformation is obtained as a result of slip. (auth)

10859 P-809
Brush Beryllium Co., Cleveland.
PROGRESS REPORT NO. 10 [FOR] PERIOD APRIL 1–APRIL 30, 1947. P. R. Kalischer. July 28, 1947. Decl. Feb. 9, 1956. 26p. Contract W-22-075-eng-11. $4.80(ph OTS); $2.70(mf OTS).

The addition of 2% Be metal to crude BeF_2 showed that a marked purification could be obtained in the vacuum sublimation of BeF_2 in Nichrome V equipment under an H_2 atmosphere. The addition of Zn and of K to Mg in reduction

runs of BeF with Mg did not give larger grain-size Be particles. Grain growth can be secured by heat treatment of BeF_2 in the range of 1230 to 1240°C, but separation was not attempted. Microscopic examination indicated separation is possible. Several $BeCl_2$ reduction runs were made, but the yields were disappointing due to the formation of oxides, and oxychlorides of Be in the reaction product. (F.S.)

Refer also to abstracts 10720 and 10821.

PHYSICS

10860 AECU-3217
Sandia Corp., Albuquerque, N. Mex.
A STUDY OF LOCATION TIMES FOR POSITIONS ARRANGED ON A PANEL IN A RANDOM AND AN ORDERED MANNER. J. R. Beeler. May 25, 1955. 8p. (TM-92-55-51). $1.80(ph OTS); $1.80(mf OTS).

The results of an experimental pilot study on the location time, for a sequence of N specified positions on a panel, are given for $1 \leq N \leq 30$. The positions to be located were randomly arranged on one set of panels and arranged according to an ordering scheme on a second set of panels. The location time for N positions randomly arranged on a panel varies approximately as N^2. In the case of an ordered arrangement the location time is essentially proportional to N. Even for as few as 30 positions, the location time for a random arrangement was twelve times greater than for an ordered panel. For 60 positions the ratio would be 19, and for 90 positions the ratio would be 26. (auth)

10861 AECU-3221
[Sandia Corp., Albuquerque, N. Mex.]
THE SHAPE OF A SHOCK WAVE DERIVED FROM A SPHERICAL SHOCK WAVE INCIDENT ON A CONCAVE WEDGE. Jay Todd, Jr. and Ralph L. Schellenbaum. July 7, 1954. 11p. (TM-114-54-41). $3.30(ph OTS); $2.40 (mf OTS).

When a one-half ounce spherical charge of high explosive is detonated over a flat plane bounded by a 5° incline, the type of phenomenon encountered depends on the distance from ground zero to the beginning of the incline. If this distance is 48 in. the wave assumes a smooth contour on the plane. Detailed investigation of the shock velocity above the plane reveals that there is a pressure gradient along the shock front for a considerable region which replaces the usual triple point. (auth)

10862 AECU-3227
Sandia Corp., Albuquerque, N. Mex.
RADIAL VIBRATIONS IN SHORT, HOLLOW CYLINDERS OF BARIUM TITANATE. C. V. Stephenson. Dec. 10, 1954. 19p. (TM-267-54-51). $3.30(ph OTS); $2.40(mf OTS).

The mathematics has been developed for the determination of the radial coupling coefficient for a hollow cylinder of electrostrictive material whose length is small compared to its outside diameter. (auth)

10863 AECU-3228
Sandia Corp., Albuquerque, N. Mex.
PATH OF TRIPLE POINT FOR SPHERICAL SHOCKS ABOVE A RIGID PLANE. Jay Todd, Jr. and Ralph L. Schellenbaum. July 13, 1954. 11p. (TM-113-54-51). $1.80(ph OTS); $1.80(mf OTS).

Paths of triple points of Mach reflections produced by 0.5-oz pentolite detonations have been observed for various burst heights. The slopes, χ, at points on the curved path are found to vary from values of χ predicted from plane shock wave data. This discrepancy is attributed to the shock strength conditions at the early inception of the Mach reflection, which later influence the triple point equilibrium, and in lesser degree to radius of curvature effects. (auth)

10864 CF-55-10-61
Oak Ridge National Lab., Tenn.
LATERAL PRESSURE AND DENSITY OF BARYTES AGGREGATE AND WATER MIXTURE. J. E. Euster. Oct. 14, 1955. 8p. Contract [W-7405-eng-26]. $1.80 (ph OTS); $1.80(mf OTS).

Tests to determine lateral pressures exerted by barytes–H_2O mixtures are described, and resulting pressure curves are included. (B.J.H.)

10865 KAPL-M-LFE-7
Knolls Atomic Power Lab., Schenectady, N. Y.
ESTIMATED CRITICAL CONSTANTS, EXTRAPOLATED VAPOR PRESSURE, AND EQUATION OF STATE OF SODIUM. Leo F. Epstein. Sept. 20, 1951. 14p. Contract W-31-109-Eng-52. $3.30(ph OTS); $2.40(mf OTS).

Critical constants, vapor pressure, and equation of state of Na were extrapolated from low-temperature data and evaluated for high-temperature use. (F.S.)

CRYSTALLOGRAPHY AND CRYSTAL STRUCTURE

10866 CF-48-6-34
Oak Ridge National Lab., Tenn.
SUPERLATTICE PRESENCE IN Cu_3Au AND FeCo SYSTEMS. Sidney Siegel and C. G. Shull. 1948. Decl. Dec. 13, 1954. 5p. Contract [W-7405-eng-26]. $1.80(ph OTS); $1.80(mf OTS).

The superlattice structures and the scattering cross sections of Cu–Au and Fe–Co alloys were studied by neutron-diffraction analysis. (F.S.)

10867 KAPL-M-JBS-8
Knolls Atomic Power Lab., Schenectady, N. Y.
STUDY OF INTERSTITIAL ATOMS AND VACANCIES IN IRRADIATED CRYSTALS USING X-RAY MEASURED LATTICE PARAMETER TOGETHER WITH DENSITY MEASUREMENTS. J. B. Sampson and C. W. Tucker, Jr. Apr. 1, 1954. 7p. Contract W-31-109-Eng-52. $1.80 (ph OTS); $1.80(mf OTS).

GASES

Refer to abstract 10899.

INSTRUMENTS

10868 AECD-3783
Monsanto Chemical Co., Dayton, Ohio.
HIGH-FREQUENCY PULSE GENERATOR. Philip E. Ohmart. July 3, 1947. Decl. Nov. 28, 1955. 8p. (T-1097). $1.80(ph OTS); $1.80(mf OTS).

A high-frequency pulse generator to be used in research on high-rate trigger pairs and scaler circuits was developed. It provides a pulse recurrence frequency range of 10,000 to 2,500,000 pulses per second, both positive and negative. A linear amplifier provides amplification of the input since wave. (F.S.)

10869 AECD-4154
Tennessee Eastman Corp., Oak Ridge, Tenn.
THE EFFECT OF GEOMETRY AND VOLTAGE VARIATIONS ON THE OPERATION OF THE PHILIPS ION GAGE. C. R. McKinney, D. T. Eggen, A. Bishop, W. A. Arnold,

and C. Starr. Aug. 22, 1945. Decl. Feb. 15, 1956. 65p. (D-4.250.14). $10.80(ph OTS); $3.90(mf OTS).

The study of ten P.I.G. geometries with Cu electrodes and d-c voltage indicates that from a pressure of 0.1 to about 3.0 microns, depending upon the gage, there is a consistent change in the air pressure-current characteristics of a P.I.G. as the geometry and voltage are changed. At higher pressures discontinuities appear in the gage current and prohibit its use as a pressure gage. In all useful geometries, the greater the applied voltage above 1000 volts, the shorter the useful portion of the pressure-current curve became. Below 1000 volts the curve tended to be unstable. With other conditions constant, the pressure limit increased as the cathode separation decreased and as the anode diameter increased. The empirical equation for the current in certain Philips Ion Gages at certain pressures and voltages is $I = a' Pe^{(P/b)}$ where I is the current, P the pressure, e the Naperian base and a' and b constants and dependent upon geometry and voltage. (auth)

10870 AECU-3202
Sandia Corp., Albuquerque, N. Mex.
PRINCIPLES AND TECHNIQUES OF ULTRASONIC INSPECTION. Harold C. Psillas. May 23, 1955. 87p. (TM-102-55-55). $13.80(ph OTS); $4.80(mf OTS).

Ultrasonic inspection for subsurface flaws is widely used in American industry. This report reviews the general principles and specific techniques of ultrasonic testing. (auth)

10871 AECU-3208
Sandia Corp., Albuquerque, N. Mex.
PRINCIPLES AND TECHNIQUES OF ULTRASONIC INSPECTION. H. C. Psillas and D. W. Ballard. July 2, 1953. 23p. (TM-76-53-15). $3.30(ph OTS); $2.40 (mf OTS).

Ultrasonic inspection for subsurface flaws is widely used in American industry. This report reviews the general principles and specific techniques of ultrasonic testing. (auth)

10872 AECU-3215
Sandia Corp., Albuquerque, N. Mex.
A HUMAN ENGINEERING GUIDE TO THE ARRANGEMENT OF ELEMENTS ON A CONTROL PANEL. H. L. Williams. Dec. 10, 1954. 6p. (TM-270-54-51). $1.80(ph OTS); $1.80(mf OTS).

A compilation is given of general information concerned with the arrangement of elements on a control panel. Arrangement considerations that lead to improved ease and accuracy of operation are presented to assist the engineer in designing new control panels. (auth)

10873 AECU-3216
Sandia Corp., Albuquerque, N. Mex.
A DISCUSSION ON THE LAYOUT OF ELEMENTS ON A CONTROL PANEL. J. R. Beeler. Aug. 1, 1955. 17p. (TM-159-55-51). $3.30(ph OTS); $2.40(mf OTS).

An outline is given of the principles and methods employed by 5100 Human Engineering Personnel in consultation on test equipment panel layout. The process of control panel layout is partially formalized with particular emphasis on test equipment panels. An experimental method is proposed for selecting an optimum panel layout. The essential role of experimentation is pointed out. The optimal layout for a nonrepetitive procedure is deduced and generalized to give methods of layout solution for the general repetitive procedure. (auth)

10874 AECU-3226
[Sandia Corp., Albuquerque, N. Mex.]
THE DIRECT READING HEIGHT GAUGE AND ITS APPLICATIONS TO INSPECTION WORK. MODEL 1 AND MODEL 2. P. W. Shew. Dec. 1, 1953. 30p. (TM-220-53-15). $4.80(ph OTS); $2.70(mf OTS).

The direct reading height gauge is a new and fast operating instrument designed primarily for checking hole patterns, but it can also be used for a number of other purposes as well. A brief review is given of what the gauge is, what it will do, and how it is operated. Speed and the elimination of most of the sources of error are its chief attributes. (auth)

10875 AECU-3229
Sandia Corp., Albuquerque, N. Mex.
AN ERROR ANALYSIS OF R-C TIMERS. R. P. Stromberg. Aug. 27, 1954. 13p. (TM-192-54-53). $3.30(ph OTS); $2.40(mf OTS).

Results show that a variation in sensing voltage produces an error in timing which increases logarithmically with time interval. Also, variation in supply voltages produces the same type of errors, but the errors are decreased by the ratio of the sensing to supply voltage. An interesting conclusion from the analysis is that if the ratio of supply to sensing voltages is maintained constant, no change in timing will result. (auth)

10876 AECU-3231
[Sandia Corp., Albuquerque, N. Mex.]
SOME OBSERVATIONS ON THE "BAND PASS" METHOD OF VIBRATION ANALYSIS. D. M. Ellett. July 16, 1953. 33p. (TM-104-53-51). $4.80(ph OTS); $2.70(mf OTS).

The general characteristics of band pass filters in relation to vibration analysis are described. Comparisons are made on several steady state wave shapes between the components passed for various filter settings of the SKL Filter No. 302 and the components which would be passed by a hypothetical filter having the same attenuation characteristics but without phase shift. Observations are made on the differences shown by the comparisons and on the use of a band filter as an instrument for analysis of vibration records. (auth)

10877 AECU-3233
Sandia Corp., Albuquerque, N. Mex.
A COMPUTER TO SOLVE ONE FORM OF VOLTERRA'S INTEGRAL EQUATION. C. S. Williams, Jr. June 2, 1954. 22p. (TM-104-55-54). $4.80(ph OTS); $2.70(mf OTS).

Design considerations are discussed for a computer to solve one form of Volterra's integral equation. Some examples are considered to illustrate the operation of the computer. Design modifications in the output circuit are discussed. (C.H.)

10878 AECU-3234
Sandia Corp., Albuquerque, N. Mex.
AUTO-EDIT (AUTOmatic Information EDITor). G. R. Bussey. July 9, 1953. 51p. (TM-77-53-52). $6.30(ph OTS); $3.00(mf OTS).

A sampling theory is presented which provides for function representation by variable length linear segments. Equipment is described which furnishes sampling commands to an analog-to-digital data converter in accordance with the theory. Non-linearity of the data to be sampled determines the sampling rate, which varies with the data and yields the desired information with a minimum number of samples. Used in conjunction with an analog-to-digital data converter, this technique materially reduces the necessary number of readings which must be taken, stored, processed, and ultimately plotted. (auth)

10879 AECU-3238
Sandia Corp., Albuquerque, N. Mex.
BEHAVIOR OF TRANSISTORS IN A MAGNETIC FIELD. Supplement to [AECU-3223], TM-151-54-51. Howard H. Sander. Aug. 17, 1954. 5p. (TM-196-54-51). $1.80(ph OTS); $1.80(mf OTS).

Experiments are described which show that the characteristics of both junction and point-contact transistors can be varied and controlled by passing magnetic fields through them. The gain of an amplifier can be controlled, and the amplitude of fixed frequency oscillator modulated by means of passing a magnetic field through the transistor. (auth)

10880 AECU-3239
Sandia Corp., Albuquerque, N. Mex.
A CAPACITIVE MANOMETER. R. S. Jamieson. Mar. 23, 1954. 9p. (TM-21-54-53). $1.80(ph OTS); $1.80 (mf OTS).

A discussion is presented of the advantages of reading a Hg column manometer by means of the variable capacitance existing between the Hg column and a metallic coating plated on the outside of the barometric column. Also, a method is presented for converting the capacitance to a digital reading of pressure. (auth)

10881 CF-55-10-73
Oak Ridge National Lab., Tenn.
THE RHEOLOGY OF THORIUM OXIDE SLURRIES. D. G. Thomas and T. M. Gayle. Oct. 17, 1955. 28p. Contract [W-7405-eng-26]. $0.25(OTS).

Descriptions are given of the design and construction of a capillary viscometer for measurement of viscosity of aqueous slurries at temperatures up to 300°C. (F.S.)

10882 HW-28431
[Hanford Atomic Products Operation, Richland, Wash.]
DECONTAMINATION OF PORTABLE INSTRUMENTS. C. M. Unruh. May 22, 1953. Changed from OFFICIAL USE ONLY July 6, 1956. 4p. Contract [W-31-109-eng-52]. $1.80(ph OTS); $1.80(mf OTS).

10883 IDO-16278
Phillips Petroleum Co. Atomic Energy Div., Idaho Falls, Idaho.
REMOTE CONTROLLED MILLING MACHINE FOR MTR HOT CELL. F. L. Petree. May 16, 1955. 11p. Contract AT(10-1)-205. (PPC-169). $3.30(ph OTS); $2.40(mf OTS).

Remote control of a milling machine for machining contaminated materials within the shielded volume of the MTR hot cell is described. (J.E.D.)

10884 N-1289f
[Chicago. Univ. Metallurgical Lab.]
A NOTE CONCERNING THE INTERPRETATION OF REPORTS AND REFLECTOGRAMS MADE USING THE SUPERSONIC REFLECTOSCOPE. D. M. Barten. [194?]. Decl. Jan. 11, 1956. 3p. Contract [W-7401-eng-37]. (MUC-FF-140). $1.80(ph OTS); $1.80(mf OTS).

The operating principle of the supersonic reflectoscope is described and information helpful in interpretation of reflectograms given. (T.R.H.)

10885 TID-5162
RCA Victor Div., Radio Corp. of America, Harrison, N. J.
DEVELOPMENT AND MANUFACTURE OF SUPER-POWER PULSE OPERATED POWER TUBES. Quarterly Report No. 5 [for] December 1, 1951 to February 29, 1952. M. V. Hoover. Mar. 31, 1952. Changed from OFFICIAL USE ONLY Aug. 8, 1956. 72p. Contract AT(11-1)-143. (TLE-990-723). $10.80(ph OTS); $3.90(mf OTS).

10886 TID-5163
RCA Victor Div., Radio Corp. of America, Harrison, N. J.
[SUPER POWER TUBE DEVELOPMENT]. Quarterly Report No. 6 [for] March, April, May 1952. M. V. Hoover. June 30, 1952. Changed from OFFICIAL USE ONLY Aug. 6, 1956. 75p. Contract AT(11-1)-143. (TLE-990-972). $12.30(ph OTS); $4.50(mf OTS).

The evolution of a novel super-power tube and the establishment of facilities for the subsequent manufacture of super-power tubes are presented. These include manufacturing specifications, processes, procedures, tools, jigs, and fixtures. Engineering development is directed toward a shielded-triode structure which will generate as much continuous power as is practical. The tube under development is the RCA A-2332, a shielded-grid beam triode. A program consists of expanded super-power tube manufacturing facilities, involving personnel, tools, electrical test equipment and floor space and of work on the evolution of refinements in the electron discharge systems employed in super-power tubes. (auth)

10887 TID-5164
RCA Victor Div., Radio Corp. of America, Harrison, N. J.
SUPER POWER TUBE DEVELOPMENT. Quarterly Report No. 7 [for] June, July, August 1952. M. V. Hoover. Sept. 30, 1952. Changed from OFFICIAL USE ONLY Aug. 6, 1956. 87p. Contract AT(11-1)-143. (TLE-990-1063). $13.80(ph OTS); $4.80(mf OTS).

10888 TID-5166
RCA Victor Div., Radio Corp. of America, Harrison, N. J.
SUPER POWER TUBE DEVELOPMENT. Quarterly Report No. 9 [for] January, February, March 1953. M. V. Hoover. Apr. 30, 1953. Changed from OFFICIAL USE ONLY Aug. 6, 1956. 27p. Contract AT(11-1)-143. (TLE-990-1292). $4.80(ph OTS); $2.70(mf OTS).

Results of testing the A-2332 tube indicate that it will function as efficiently at a frequency of 50 Mc as at 12 Mc. The design, construction, and assembly of a tube using ceramic seals and envelopes are described in detail. (For preceding period see TID-5155.) (J.E.D.)

10889 TID-5167
RCA Victor Div., Radio Corp. of America, Harrison, N. J.
SUPER POWER TUBE DEVELOPMENT. Quarterly Report No. 10 [for] April, May, June 1953. M. V. Hoover. July 31, 1953. Changed from OFFICIAL USE ONLY Aug. 6, 1956. 30p. Contract AT(11-1)-143. (TLE-990-1381). $4.80(ph OTS); $2.70(mf OTS).

Work is continuing on the development and construction of an A-2332 tube using ceramic seals and envelopes. As the desirability of having tubes capable of operating at increasingly higher frequencies appears to be increasing, a review of "single-ended" and "double-ended" tubes and their circuitry is given. The advantages and disadvantages of both are discussed. (For preceding period see TID-5166. (J.E.D.)

10890 TID-5249
RCA Victor Div., Radio Corp. of America, Harrison, N. J.
SUPER POWER TUBE DEVELOPMENT. Quarterly Report No. 14 [for] April, May, June 1954. M. V. Hoover. July 31, 1954. Changed from OFFICIAL USE ONLY Aug. 6, 1956. 17p. Contract AT(11-1)-143. $4.80(ph OTS); $2.70(mf OTS).

The development and construction of an A-2322 type of shielded tube employing ceramic envelopes are reported. The ceramic envelope A-2322-C shielded-triode tube development has proceeded to the point where the tube is capable of delivering 750 kev out put at 20 kv plate voltage during operation at a frequency of 50 mc. (For preceding period see TID-5248.) (J.E.D.)

ISOTOPES

Refer to abstract 10992.

ISOTOPE SEPARATION

10891 FTH-25
Tennessee Eastman Corp., Oak Ridge, Tenn.
TANK OUTGASSING. F. T. Howard. Mar. 28, 1945. Decl. Nov. 29, 1955. 17p. $0.20(OTS).

The factors involved in tank outgassing are briefly discussed, and steps which may be taken to reduce outgassing time are suggested. (B.J.H.)

10892 Y-B22-18
[Carbide and Carbon Chemicals Corp. Y-12 Plant, Oak Ridge, Tenn.]
COLLECTION OF IONS IN CYCLORATOR. Raymond Murray. Nov. 29, 1948. Decl. Feb. 8, 1956. 5p. Contract [W-7405-eng-26]. $1.80(ph OTS); $1.80(mf OTS).

It was found that there is no loss in enhancement from deceleration, with sine wave applied voltage in the collector of a cyclorator. Improvements in enhancement above the lower limit of 4.5 can be achieved by improving the "squareness" of the voltage at the M and by obtaining better G focusing. (F.S.)

10893 Y-B22-27
[Carbide and Carbon Chemicals Corp. Y-12 Plant, Oak Ridge, Tenn.]
MATHEMATICAL DISCUSSION OF COLLECTION PROPERTIES IN CYCLORATOR CONSIDERING MAGNETIC FIELD EFFECT. Mozelle Rankin. Mar. 14, 1949. Decl. Feb. 8, 1956. 23p. Contract [W-7405-eng-26]. $4.80 (ph OTS); $2.70(mf OTS).

MASS SPECTROGRAPHY

10894 IDO-14371
Phillips Petroleum Co. Atomic Energy Div., Idaho Falls, Idaho.
PULSE MAGNETIZATION OF THE MAGNET FOR THE CPP MASS SPECTROMETER. F. L. Petree. Mar. 22, 1955. 5p. Contract AT(10-1)-205. (PPC-117). $1.80(ph OTS); $1.80(mf OTS).

Magnetization of the Alnico V core of the mass spectrometer at CPP by charging a capacitor bank and discharging through a coil around the core is described. (T.R.H.)

10895 Y-529
Carbide and Carbon Chemicals Corp. Y-12 Plant, Oak Ridge, Tenn.
EFFECT OF SPACE CHARGE ON FOCUSING PROPERTIES IN A PARTIALLY NEUTRALIZED MASS SPECTROGRAPH BEAM. Mozelle Rankin and Raymond Murray. Nov. 23, 1949. Decl. Jan. 30, 1956. 22p. Contract W-7405-eng-26. $3.30(ph OTS); $2.40(mf OTS).

Changes caused by a partially neutralized space charge in the location and width of the focal line segment of a mass spectrograph beam are discussed. (auth)

MATHEMATICS

10896 CF-53-8-40
Oak Ridge National Lab., Tenn.
SELF-ADJOINTNESS FOR DIFFUSION PROBLEMS. W. C. Sangren. Aug. 6, 1953. 13p. Contract [W-7405-eng-26]. $3.30(ph OTS); $2.40(mf OTS).

The self-adjointness of the operators associated with multi-group, multi-region diffusion problems is discussed. The conditions for the self-adjointness of a function are also described. (B.J.H.)

10897 CF-54-1-31
Oak Ridge National Lab., Tenn.
HYPERGEOMETRIC FUNCTIONS FOR A PAIR OF DIFFERENTIAL EQUATIONS. W. C. Sangren. Jan. 12, 1954. 31p. $6.30(ph OTS); $3.00(mf OTS).

10898 CF-55-7-9
Oak Ridge National Lab., Tenn.
ON THE BEHAVIOR OF SOLUTIONS OF ORDINARY FINITE DIFFERENCE EQUATIONS. A. C. Downing, T. W. Hildebrandt, and W. C. Sangren. July 1, 1955. 5p. Contract [W-7405-eng-26]. $1.80(ph OTS); $1.80(mf OTS).

It is shown that, even for a simple ordinary differential equation, the corresponding difference equation solution can exhibit an anamalous character. In particular, the equation $y'' - \lambda^2 y = 0$ is considered. (B.J.H.)

MEASURING INSTRUMENTS AND TECHNIQUES

10899 AECD-3821
Knolls Atomic Power Lab., Schenectady, N. Y.
AN ION CHAMBER FOR THE DETERMINATION OF SMALL AMOUNTS OF TRITIUM IN OTHER GASES. H. C. Mattraw. May 5, 1951. Decl. with deletions Dec. 6, 1955. 13p. Contract W-31-109-eng-52. $3.30(ph OTS); $2.40 (mf OTS).

Designs are given for ionization chambers which are capable of determining tritium in other gases when the amount of tritium present lies in the intermediate range between several parts per billion and about 0.1%. One chamber consists of a glass envelope which is coated inside with Al to form one electrode. The collector electrode is an Al rod. Another chamber employs Ag, rather than Al, electrodes. Present tests are confined to the Ag-electrode chamber. Pressure sensitivity and calibration data are given. A mathematical expression for the relation between tritium pressures and ion chamber current is also given. (B.J.H.)

10900 CF-52-4-87
Oak Ridge National Lab., Tenn.
AERIAL SURVEYING WITH LIGHT AIRCRAFT FOR THE DETECTION OF RADIOACTIVE CONTAMINATION ON THE GROUND. D. M. Davis, J. C. Hart, and K. Z. Morgan. Apr. 30, 1952. 25p. Contract [W-7405-eng-26]. $4.80(ph OTS); $2.70(mf OTS).

Preliminary tests indicate that the use of light aircraft and commercially available radiation detection instruments is one of the most feasible methods of surveying large ground areas for radioactive contamination. The tests described herein were made by using an L-4 type aircraft, and a commercial G-M Survey Meter. (auth)

10901 CF-54-4-17
[Oak Ridge National Lab., Tenn.]
ANALYSIS OF THE RESPONSE CHARACTERISTICS OF THE FAST-NEUTRON DOSIMETER INTEGRATING CIRCUIT. J. E. Faulkner. Apr. 30, 1954. 13p. Contract [W-7405-eng-26]. $3.30(ph OTS); $2.40(mf OTS).

From the percentage differences it is seen that for neutron dosimetry, most of the error arises from neutrons with energies below 1 Mev. The percentage error increases as the slope increases. This is particularly important if the integrator is used in conjunction with an anthracene crystal since the slope from a Ra–Be source, the usual calibrating source, is steep. (auth)

10902 HW-29587
[Hanford Atomic Products Operation, Richland, Wash.]
USE OF COMMERCIAL GRADE METHANE IN ASP COUNTING INSTRUMENTS. M. J. Rasmussen. Oct. 8, 1953.

Decl. July 24, 1956. 7p. Contract [W-31-109-Eng-52]. $1.80(ph OTS); $1.80(mf OTS).

Commercial methane was substituted successfully for 99%-pure CH_4 and its use is recommended in the Simpson Proportional Alpha Counter. (auth)

10903 HW-30492
[Hanford Atomic Products Operation], Richland, Wash.
STANDARD PRACTICES COUNTING MANUAL. L. C. Schwendiman. Jan. 4, 1954. Changed from OFFICIAL USE ONLY July 6, 1956. 65p. Contract [W-31-109-Eng-52]. $10.80(ph OTS); $3.90(mf OTS).

Data are presented which can be used to determine the disintegration rates of radioactive samples from counting rates measured with routinely used laboratory instruments. Emphasis is placed on isotopes of particular interest to the radiological sciences programs. Decay tables are included. The various factors affecting counting rates are discussed and methods are described by which these factors were determined. (C.H.)

10904 HW-33121
[Hanford Atomic Products Operation, Richland, Wash.]
HANFORD SHIELDING PROGRAM PROCEDURES FOR RADIOACTIVE FOIL PREPARATION AND COUNTING. R. L. Tomlinson. Jan. 1, 1955. Changed from OFFICIAL USE ONLY July 6, 1956. 39p. Contract [W-31-109-Eng-52]. $6.30(ph OTS); $3.00(mf OTS).

Procedures are described which were devised to aid engineering and laboratory assistants in carrying out their specific assignments in Hanford shield attenuation measurements and at the same time in obtaining an understanding of some of the more basic fundamentals associated with the field of beta counting and neutron flux determinations. It is not intended to be a strictly technical document but merely a guide that may answer many of the routine questions that arise from time to time when working with low level radioactivity. This manual may also serve as reference for the laboratory procedures used in obtaining the large amount of shield attenuation data taken at Hanford. (auth)

10905 HW-33505
Hanford Atomic Products Operation, Richland, Wash.
BETA AND GAMMA RAY DOSIMETRY WITH THIN SCINTILLATORS. E. D. Falk and W. C. Roesch. Sept. 9, 1954. Changed from OFFICIAL USE ONLY July 6, 1956. 26p. Contract W-31-109-Eng-52. $4.80(ph OTS); $2.80 (mf OTS).

Results are reported from an investigation of properties of scintillation detectors as applied to the dosimetry of β and γ radiation. Thin scintillators of anthracene which are transparent to their own light and reasonably strong can be made by a hot pressing method from anthracene flakes. These thin scintillators, in thicknesses of 24 mg/cm^2 or less, are satisfactory for general dosimetry work. The photomultiplier current for unit dose rate for these thin scintillators is independent of gamma ray energy above 0.10 Mev and electron (β ray or monoenergetic electrons from an accelerator) energy above about 0.5 Mev. The response to off-axis β ray sources is in satisfactory agreement with that of an extrapolation chamber. The sensitivity is adequate for personnel protection measurements. (auth)

10906 IDO-16271
Phillips Petroleum Co. Atomic Energy Div., Idaho Falls, Idaho.
CALIBRATION OF SILVER ACTIVATED PHOSPHATE GLASS GAMMA DOSIMETERS. C. H. Hogg. Feb. 1, 1955. 7p. Contract AT(10-1)-205. (PPC-97). $1.80(ph OTS); $1.80(mf OTS).

Silver activated phosphate glass has been calibrated for use in monitoring γ dosages at the MTR site. The activated glass can be used to measure the range of total γ dosages from about 8×10^3 to 2×10^6 r. (auth)

10907 KAPL-M-EBF-1
Knolls Atomic Power Lab., Schenectady, N. Y.
PREPARATION OF BORON TRIFLUORIDE AND FILLING OF NEUTRON COUNTERS. E. B. Fehr. Feb. 18, 1954. 19p. Contract W-31-109-Eng-52. $3.30(ph OTS); $2.40 (mf OTS).

The technique used at KAPL for the preparation of BF_3 from $CaF_2.BF_3$ is described. This method is used for filling pulse-counting ionization chambers and other neutron counters. (auth)

NEUTRONS

10908 HW-31886
Hanford Atomic Products Operation, Richland, Wash.
NEUTRON FLUX DISTRIBUTION FROM A POINT SOURCE IN AN INFINITE MEDIUM. P. M. Anselone. May 20, 1954. 9p. Contract [W-31-109-eng-52]. $1.80(ph OTS); $1.80(mf OTS).

Equations are developed which demonstrate two methods for determining neutron flux distribution from a point source. (D.E.B.)

10909 KAPL-M-SP-4
Knolls Atomic Power Lab., Schenectady, N. Y.
THE CONVERSION OF FAST NEUTRON FLUX TO DOSE. S. Pearlstein and M. J. Abrams. June 10, 1954. 13p. Contract W-31-109-eng-52. $3.30(ph OTS); $2.40 (mf OTS).

The single collision and multi-collision dose conversion curves have been applied to the Po–Be and fission neutron spectrums within the limits of 0.1 mev and infinity to determine an average flux to dose conversion factor. The results are tabulated. (auth)

10910 KAPL-M-SP-7
Knolls Atomic Power Lab., Schenectady, N. Y.
ESTIMATION OF PILE IRRADIATION TIME. S. Pearlstein. Oct. 31, 1955. 15p. Contract W-31-109-Eng-52. $3.30(ph OTS); $2.40(mf OTS).

A quick method for estimating pile irradiation times to achieve a desired percentage burnup is described. The graphical results given are general for all materials, requiring only that the volume, outside surface area, and microscopic cross section of the sample be known. (auth)

NUCLEAR PHYSICS

10911 CF-53-10-7
Oak Ridge National Lab., Tenn.
A NOTE ON THE MAXIMUM TOTAL CROSS SECTION FOR RESONANCE REACTIONS. A. Simon and T. A. Welton. Oct. 1, 1953. 6p. Contract [W-7405-eng-26]. $1.80(ph OTS); $1.80(mf OTS).

10912 HW-36822
Hanford Atomic Products Operation, Richland, Wash.
PARTICLE DISTRIBUTION FROM A UNIT SOURCE. PART A. G. W. Anthony. Apr. 29, 1955. 10p. Contract [W-31-109-Eng-52]. $1.80(ph OTS); $1.80(mf OTS).

The equations for the particle distribution from a unit isotropic source are developed. (B.J.H.)

10913 MonP-250
[Clinton Labs., Oak Ridge, Tenn.]
PHYSICS DIVISION MONTHLY REPORT FOR JANUARY 1947. L. W. Nordheim. Feb. 19, 1947. Decl. Jan. 11, 1956. 37p. Contract W-35-058-eng-71. $6.30(ph OTS); $3.00(mf OTS).

NUCLEAR PROPERTIES

10914 CF-55-11-151
Oak Ridge National Lab., Tenn.
SURVEY OF SOME RECENT DATA ON TRANSURANICS. J. O. Blomeke and J. Halperin. Nov. 22, 1955. Decl. Apr. 4, 1956. 12p. Contract W-7405-eng-26. $3.30(ph OTS); $2.40(mf OTS).

Most recent cross section data for transuranic isotopes are compiled, primarily for use in a computer study of transuranic buildup in reactor fuels. (T.R.H.)

10915 IDO-16268
Phillips Petroleum Co. Atomic Energy Div., Idaho Falls, Idaho.
NEUTRON RESONANCE PARAMETERS AND TOTAL CROSS SECTIONS IN U^{235}. O. D. Simpson, R. G. Fluharty, F. B. Simpson, and R. M. Brugger. Nov. 21, 1955. 12p. Contract AT(10-1)-205. (PTR-14). $3.30(ph OTS); $2.40 (mf OTS).

The total cross section of U^{235} has been measured from 9 to 100 ev with a resolution of 0.05 to 0.07 μsec/meter using the MTR fast chopper, and resonances have been studied below 60 ev. Runs from 100 ev to 10 kev are in progress but have not been completed yet. (auth)

10916 KAPL-M-JJB-1
Knolls Atomic Power Lab., Schenectady, N. Y.
ANISOTROPY CORRECTION FOR BERYLLIUM TRANSPORT CROSS SECTIONS AND THE AVERAGE LETHARGY INCREASE PER SCATTERING COLLISION (ξ). J. J. Bulmer. Aug. 30, 1955. 18p. Contract W-31-109-Eng-52. $3.30(ph OTS); $2.40(mf OTS).

The results of several neutron scattering experiments in Be were used to determine the angular distribution of scattered neutrons as a function of energy. From these data revised transport cross sections—which included corrections for anisotropic scattering in the center of mass system—were calculated. With this new data, Fermi-age calculations in Be were performed and gave results in reasonably good agreement with experimental values. Furthermore, the revised cross section data were used in calculations of slowing down density to give an estimate of their effect on criticality calculations for a Be moderated reactor. (auth)

NUCLEAR REACTORS

10917 BNL-1072
Brookhaven National Lab., Upton, N. Y.
FLUID FUEL REACTORS WITH URANIUM-BISMUTH. F. T. Miles, D. W. Bareis, O. E. Dwyer, D. H. Gurinsky, I. Kaplan, R. J. Teitel, and C. Williams. Jan. 1952. Decl. Dec. 15, 1955. 14p. Contract [AT-30-2-gen-16]. (LFR-4). $0.15(OTS).

Uranium–bismuth solutions or dispersions of USn_3 in liquid Bi–Pb–Sn are proposed as fluid fuels for a power breeder or converter. These fuels offer advantages of high specific power, unlimited burn-up, good neutron economy, and low over-all operating costs which might lead to truly economical nuclear power. A simple and effective chemical process based on the extraction of liquid metal with fused salts will remove fission products in a concentrated form for use or storage. A process for the continuous separation of U^{233} from Th in the blanket is described. Several design possibilities are discussed. (auth)

10918 BNL-1580
Brookhaven National Lab., Upton, N. Y.
MEASUREMENTS OF WATER LATTICES. H. Kouts and J. Chernick. July 20, 1953. Decl. Dec. 13, 1955. 3p. $1.80(ph OTS).

Fast fission factors, ε, were measured for U–H_2O matrices as a function of the U to H_2O volume ratio. (D.E.B.)

10919 BNL-2741
Brookhaven National Lab., Upton, N. Y.
A STUDY OF THE FAST EFFECT. B. Mozer. Apr. 22, 1954. Decl. Feb. 9, 1956. 28p. Contract AT(30-2)-gen-16. $4.80(ph OTS); $2.70(mf OTS).

The reactivity change due to fissions caused by fast neutrons in various types of thermal reactors was calculated, and an average value of the fast effect was obtained for several volume ratios of moderator to U. (F.S.)

10920 BNL-2744
Brookhaven National Lab., Upton, N. Y.
EXTERNALLY MODERATED LMFR'S (NON-BREEDING TYPE). B. Mozer. June 10, 1955. Decl. Feb. 9, 1956. 17p. Contract AT(30-2)-gen-16. $3.30(ph OTS); $2.40 (mf OTS).

Critical masses from 11 to 45 kg and critical sizes from 1 to 5 ft in diameter were obtained for spherical externally moderated liquid metal fuel reactors containing 0.2 to 10% U to Bi atom ratios in the core. The results show that it is possible to produce at low power a useful thermal flux greater than 10^{15} n/cm^2-sec in the reflector. (auth)

10921 BNL-2745
Brookhaven National Lab., Upton, N. Y.
RELAXATION LENGTHS IN LIGHT WATER LATTICES (1.3% METAL). Herbert Kouts. Sept. 16, 1953. Decl. Feb. 8, 1956. 3p. Contract AT(30-2)-gen-16. $1.80(ph OTS); $1.80(mf OTS).

10922 BNL-2746
Brookhaven National Lab., Upton, N. Y.
"EYEWASH" CALCULATIONS FOR THE LMFR BREEDER. B. Mozer. May 26, 1953. Decl. Feb. 9, 1956. 19p. Contract AT(30-2)-gen-16. $3.30(ph OTS); $2.40(mf OTS).

Critical sizes, critical masses, and neutron economies were obtained for liquid metal fuel reactors with varying amounts of moderation and uranium concentration in the core. The amount of Th-Bi slurry in the breeding blanket and the size of the breeding blanket was changed and the effect of these changes on the breeding gain and critical size was determined. (auth)

10923 CE-501
[Chicago. Univ. Metallurgical Lab.]
HEAT TRANSFER EXPERIMENTS FOR HELIUM PLANT. R. N. Lyon. Feb. 25, 1943. Decl. Feb. 14, 1956. 21p. (A-499). $3.30(ph OTS); $2.40(mf OTS).

Full scale experiments were conducted to determine the gas film heat transfer coefficients in a proposed helium cooled power plant. The effects of bevelling the edges of the flat plates proposed and of constricting the ducts before and after the element were explored. The results show that the average coefficient for the element as a whole is 3 to 19% more than would be predicted from the ordinarily used Dittus-Boelter equation. However, the coefficient was found to vary locally within the element in such a way that the film Δ T at the outside of the element is 25 to 50% greater than the average. Bevelling the plates and constricting the ducts both reduce the average coefficient, but the former smooths out temperature inequalities in the elements while the latter aggravates them in the ranges explored. Gas velocities up to 735 ft./sec. were used and heat transfer coefficients up to 1300 Btu/hr/°F/ft^2 and more were found. (auth)

10924 CF-47-2-36
Oak Ridge National Lab., Tenn.
PROPOSED EXPERIMENTAL HIGH TEMPERATURE

POWER PILE—DESIGN 3. C. Rogers McCullough. Feb. 21, 1947. Decl. Feb. 2, 1956. 18p. $3.30(ph OTS); $2.40(mf OTS).

10925 CF-48-12-101
Oak Ridge National Lab., Tenn.
TEMPERATURE DISTRIBUTION IN A SINGLE PLATE WHICH HAS A VARYING NEUTRON FLUX FROM THE EDGE TO THE CENTER OF THE PLATE. R. Van Winkle. Dec. 3, 1948. Decl. Feb. 1, 1956. 15p. Contract [W-7405-eng-26]. $3.30(ph OTS); $2.40(mf OTS).

A mathematical analysis was made of the temperature distribution in an (Al–U) reactor plate with a varying neutron flux from the edge to the center of the plate. (F.S.)

10926 CF-50-4-83
Oak Ridge National Lab., Tenn.
ANALYSIS OF HRE HAZARD AS A RESULT OF OVER CONCENTRATION OF SOUP SYSTEM. C. B. Graham. Apr. 18, 1950. Decl. Feb. 20, 1956. 6p. Contract [W-7405-eng-26]. $1.80(ph OTS); $1.80(mf OTS).

10927 CF-51-8-266
Oak Ridge National Lab., Tenn.
NUCLEATION AND RATE OF BUBBLE GROWTH IN HOMOGENEOUS REACTOR EXPERIMENT. D. L. Katz. Aug. 24, 1951. Decl. Feb. 9, 1956. 35p. Contract [W-7405-eng-26]. $6.30(ph OTS); $3.00(mf OTS).

A series of experiments for determining the rate of bubble growth in HRE solutions is described. General considerations of bubble growth, nucleation, gas solubility, and bubble behavior in the reactor core are discussed. A lab method for measurement of bubble growth is given. (T.R.H.)

10928 CF-52-1-209
Oak Ridge National Lab., Tenn.
CALCULATED PRESSURE DROP ACROSS REACTOR CORE VESSELS. J. O. Bradfute. Jan. 24, 1952. Decl. Feb. 20, 1956. 7p. Contract [W-7405-eng-26]. $1.80 (ph OTS); $1.80(mf OTS).

The pressure drop which might be expected to develop across the large homogeneous reactor core vessel employing rotational type flow was calculated. (F.S.)

10929 CF-52-9-197
[Oak Ridge National Lab., Tenn.]
ELEMENTARY ESTIMATION OF NEUTRON FLUX IN THE CIRCULATING SYSTEM OF THE ISHR. Melvin Tobias. Sept. 29, 1952. Decl. Nov. 29, 1955. 5p. Contract [W-7405-eng-26]. $0.15(OTS).

10930 CF-52-10-134
Oak Ridge National Lab., Tenn.
HYDRODYNAMIC STUDIES IN THREE GLASS MODELS. L. B. Lesem. Oct. 21, 1952. Decl. Feb. 6, 1956. 13p. Contract [W-7405-eng-26]. $3.30(ph OTS); $2.40(mf OTS).

As an initial attempt to select a second core for study on an intermediate (8 ft) scale, studies of flow pattern, pressure drop, mixing, and gas holdup were conducted in small glass models of possible core configurations. These models, geometrically similar to a 15 ft reactor operating at a power density of 20 to 40 kw/l with a limiting inlet velocity of 20 ft/sec, were chosen to examine the characteristics of a well mixed type flow and the possibility of modifying rotational flow to reduce the pressure drop. Flow pattern and gas holdup determinations were on a purely qualitative basis, while measurements of mixing and over-all pressure drop were of a semi-quantitative nature. (auth)

10931 CF-52-10-181
Oak Ridge National Lab., Tenn.
PRELIMINARY DESIGN OF SCREENS FOR THE INLET OF THE ISHR CORE. I. Spiewak. Oct. 18, 1952. Decl. Feb. 7, 1956. 9p. Contract [W-7405-eng-26]. $1.80(ph OTS); $1.80(mf OTS).

In order to produce slug flow in a sphere, smooth fluid expansion must be provided from the inlet pipe. This may be accomplished by the installation of diffuser screens. Equations are shown for determining the position and pressure distribution for such screens. (D.E.B.)

10932 CF-52-11-18
Oak Ridge National Lab., Tenn.
OPERATIONAL REQUIREMENTS FOR THE TEAPOT RECOMBINER. Cyril G. Lawson. Nov. 1, 1952. Decl. Feb. 7, 1956. 4p. Contract [W-7405-eng-26]. $1.80(ph OTS); $1.80(mf OTS).

The maximum rates of steam, H_2, and O_2 production at various temperatures and pressures throughout the Teapot operating range are listed. The volume flow rates and pressure drop for the recombiner are calculated. (D.E.B.)

10933 CF-53-2-76
Oak Ridge National Lab., Tenn.
NUCLEAR SAFETY OF THE HRE. S. Visner. Feb. 10, 1953. Decl. Feb. 8, 1956. 11p. Contract [W-7405-eng-26]. $3.30(ph OTS); $2.40(mf OTS).

In the light of more recent data on the temperature coefficient of reactivity and on reactivity effectiveness of the rods and reflector and on the mechanical, chemical, and hydraulic behavior of the reactor system in the HRE, recommendations on additional safeguards are offered. (T.R.H.)

10934 CF-53-2-93
Oak Ridge National Lab., Tenn.
SPECIFICATIONS AND STRESS CALCULATIONS FOR ISHR SCREENS. L. B. Lesem. Feb. 9, 1953. Decl. Feb. 20, 1956. 8p. Contract [W-7405-eng-26]. $1.80(ph OTS); $1.80(mf OTS).

Modified specifications for the filter screens for the inlet of the ISHR core are given as a result of experimental work with an 18-in. plastic scale model of the proposed ISHR. The maximum stresses occurring in the screen system are calculated and reported. (T.R.H.)

10935 CF-53-5-125
Oak Ridge National Lab., Tenn.
CAUSES OF LEAKAGE IN HRE FLANGES. D. K. Taylor and J. D. Maloney. May 1, 1953. 17p. Contract [W-7405-eng-26]. $3.30(ph OTS); $2.40(mf OTS).

Tests were made to determine the causes of leakage of the flanged pipe joints used in the HRE, including evaluations of factors such as materials, design, technique of assembly, re-use, yielding and creep, work hardening, temperature changes, and differential expansion. The test apparatus is described in detail. The cause of the joint failure seemed to be the differential expansion of the parts of the assembly during temperature changes. Design and installation recommendations are listed. (B.J.H.)

10936 CF-53-7-29
Oak Ridge National Lab., Tenn.
HYDRODYNAMIC STUDIES IN AN EIGHT-FOOT SPHERE UTILIZING ROTATING FLOW. L. B. Lesem, R. H. Wilson, and I. Spiewak. July 20, 1953. Decl. Mar. 26, 1956. 18p. Contract [W-7405-eng-26]. $3.30(ph OTS); $2.40(mf OTS).

To obtain information about the flow through the core of a large homogeneous reactor, experiments were conducted using an 8-ft sphere with 2 tangential inlets and 2 polar outlets. Results are presented of measurements of the overall pressure drop in the sphere as a function of flow rate, the static pressure distribution at the sphere wall, and velocity distribution in the sphere. Qualitative information

was obtained on the general flow pattern and gas behavior in the sphere and on operation of a large circulating system using a number of pumps in parallel. (M.P.G.)

10937 CF-53-7-205
Oak Ridge National Lab., Tenn.
CALCULATION OF WALL STRESSES IN THE "A" TANK OF OAK RIDGE RESEARCH REACTOR. J. J. Wallace. July 30, 1953. 9p. Contract W-7405-eng-26. $3.30(ph OTS); $2.40(mf OTS).

10938 CF-54-1-1
Oak Ridge National Lab., Tenn.
THE BEHAVIOR OF CERTAIN FUNCTIONS RELATED TO THE INHOUR FORMULA OF CIRCULATING FUEL REACTORS. W. K. Ergen. Jan. 15, 1954. 3p. Contract [W-7405-eng-26]. $1.80(ph OTS); $1.80(mf OTS).

10939 CF-54-3-164
Oak Ridge National Lab., Tenn.
SAFETY OF HRT. P. R. Kasten and V. K. Pare'. Mar. 25, 1954. Decl. Dec. 15, 1955. 10p. Contract [W-7405-eng-26]. $0.15(OTS).

10940 CF-54-5-6
Oak Ridge National Lab., Tenn.
BASES FOR COST EVALUATION. J. A. Lane. May 5, 1954. Decl. May 4, 1956. 4p. Contract [W-7405-eng-26]. $1.80(ph OTS); $1.80(mf OTS).

The bases for cost evaluation studies established at the Chicago Meeting of Evaluation Groups are reviewed. They should be applied to central station power plants only and, in particular, are not applicable to production reactors. (auth)

10941 CF-54-8-102
Oak Ridge National Lab., Tenn.
OAK RIDGE RESEARCH REACTOR SHADOW SHIELD EXPERIMENT. R. G. Cochran, K. M. Henry, and J. D. Flynn. Aug. 31, 1954. Decl. Feb. 20, 1956. 11p. Contract W-7405-eng-26. $3.30(ph OTS); $2.40(mf OTS).

In order to provide additional data on which to base the design of the Oak Ridge Research Reactor, a mockup of the proposed shadow shield was installed in the BSF, and γ measurements were made behind it. Views of the experimental arrangements are shown, as is the attenuation of the γ rays behind the shield. (B.J.H.)

10942 CF-54-8-232
Oak Ridge National Lab., Tenn.
PERFORMANCE TEST OF HRT FUEL SOLUTION EVAPORATOR. P. H. Harley and I. Spiewak. Aug. 13, 1954. 5p. Contract W-7405-eng-26. $1.80(ph OTS); $1.80(mf OTS).

In order to evaluate the operation of the HRT fuel solution evaporator, a full scale steep mockup of one of the two dump tank-evaporators was tested. Complete results are given and indicate that the operation is satisfactory. (B.J.H.)

10943 CF-54-9-30
[Oak Ridge National Lab., Tenn.]
PRESSURES IN THE HRT SHIELD RESULTING FROM RUPTURE OF REACTOR. P. F. Pasqua. Sept. 3, 1954. 13p. Contract [W-7405-eng-26]. $3.30(ph OTS); $2.40 (mf OTS).

Calculations show that the maximum pressure in an undivided shield resulting from a failure of a reactor vessel is 36 psia. This calculation is based on an adiabatic, constant internal energy mixing process between the reactor and shield fluids. Experiments show that the pressure rise occurs in the order of 0.5 sec. In order to determine the pressure rise in a partitioned shield, the time for the pressure rise was assumed to be 0.25 sec. and in this case the maximum calculated pressure is 40 psia. Another important consideration is the time required for the pressure in the shield, after rupture of the reactor, to return to a pressure of atmospheric. This time is a function of the rate of energy removal from the shield space. Assuming that the energy is removed only by heat transfer to the steel and concrete walls, a time of 55 min was calculated for the total pressure to decrease from 36 to 14.7 psia. (auth)

10944 CF-55-6-108
Oak Ridge National Lab., Tenn.
A SIMPLIFIED HEAT TRANSFER ANALYSIS OF THE BULK SHIELDING REACTOR IN THE THERMALLY INDUCED TURBULENT FLOW REGIME. D. C. Hamilton. June 22, 1955. 9p. Contract [W-7405-eng-26]. $1.80 (ph OTS); $1.80(mf OTS).

An analysis was made of experimental fluid temperature rise data for the B.S.R. at power levels up to one megawatt and, knowledge of the friction factor and heat transfer rate in the thermal turbulence regime where a superposed free and forced convection type of flow exists. As a result of this analysis the following two conclusions may be made: above 100 Kw in the B.S.R. the hot exhaust jet above the reactor contributes $^5/_6$ of the total buoyant force causing flow through the reactor while the reactor itself contributes only $^1/_6$. This is equivalent to a water chimney about 3.5 feet high. A conservative estimate of the onset of local boiling in the B.S.R. (for the 22A loading and 12°C water) is 1700 Kw. No prediction was made for the onset of film boiling. (auth)

10945 CF-55-10-19
Oak Ridge National Lab., Tenn.
TEMPERATURE DISTRIBUTION IN THE ORR CORE HOUSING. F. T. Binford. Oct. 14, 1955. 18p. Contract [W-7405-eng-26]. $6.30(ph OTS); $3.00(mf OTS).

Temperatures of various portions of the ORR core housing are calculated and plotted vs. heat transfer coefficient values which apply to ORR. (T.R.H.)

10946 CF-55-12-50
Oak Ridge National Lab., Tenn.
USE OF SO_2 RATHER THAN F-11 AS SECONDARY REFRIGERANT IN HRT COLD TRAPS AND PERMANENT FREEZE JACKETS. Roy C. Robertson. Dec. 9, 1955. 3p. Contract [W-7405-eng-26]. $1.80(ph OTS); $1.80 (mf OTS).

The physical and chemical properties of SO_2 and F-11 (CCl_3F) are compared. (D.E.B.)

10947 CP-1580
Chicago. Univ. Metallurgical Lab.
CALCULATION OF THE TEMPERATURE DISTRIBUTION IN A SLUG WITH A SOLID ALUMINUM CAP. F. H. Murray, W. Karush, M. Ginsburg, and G. Young. Apr. 14, 1944. Decl. Feb. 14, 1956. 11p. (A-2246). $3.30 (ph OTS); $2.40(mf OTS).

Calculations were made to determine the temperature at various points of a thick disc end cap, on the assumptions that the heat production rate is uniform throughout the slug and that the slug is in perfect thermal contact with the cap. Results obtained by different methods of computation are compared with each other and with results obtained by Drew on the Paschkis electrical network computer at Columbia University. (auth)

10948 CP-2264
[Chicago. Univ.] Metallurgical Lab.
PASSAGE OF A ROD AROUND A CORNER. A. V. Martin and G. Young. Oct. 20, 1944. Decl. Feb. 16, 1956. 10p. Contract [W-7401-eng-37]. $1.80(ph OTS); $1.80(mf OTS).

Maximum curvatures and forces set up in taking a rod around a corner in a tube are considered. (auth)

10949 HW-31157
[Hanford Atomic Products Operation, Richland, Wash.]
QUALITATIVE ANALYSIS OF PRESSURE DROP DURING IN-PILE BOILING. W. K. Woods. Mar. 17, 1954. Changed from OFFICIAL USE ONLY July 6, 1956. 8p. Contract [W-31-109-Eng-52]. $3.30(ph OTS); $2.40(mf OTS).

The analysis described in this memorandum develops the concepts that the existence of unstable conditions during in-pile boiling is relatively independent of the actual heat load on the tube, and that such unstable conditions are influenced as greatly by the amount of sub-cooling of the inlet water as they are by the pressure at which the steam is discharged from the pile. Unstable conditions may be suppressed by high flow resistance upstream from the tube, but the required resistance would be excessive in present piles. The required amount of upstream resistance may be minimized or even reduced to zero by using judicious combinations of high discharge pressure and high inlet water temperatures. Moreover, under these conditions, a change in the resistance downstream from the tube has a comparatively small effect on the amount of upstream throttling required. The analysis developed mathematically is concerned with some of the conditions which should prevail in order to operate a pile satisfactorily with boiling occurring inside the process tubes. (auth)

10950 HW-38698
[Hanford Atomic Products Operation, Richland, Wash.]
BUCKLING OF AN ELLIPTIC CYLINDER; FIRST ROOTS OF THE ZERO ORDER, MODIFIED MATHIEU FUNCTION. Paul F. Gast and Anthony Bournia. July 21, 1955. 7p. Contract [W-31-109-Eng-52]. $1.80(ph OTS); $1.80(mf OTS).

10951 IDO-16282
Phillips Petroleum Co. Atomic Energy Div., Idaho Falls, Idaho.
XENON BEHAVIOR WITH LINEARLY DECREASING POWER. J. W. Webster and G. A. Cazier. Sept. 12, 1955. 3p. Contract AT(10-1)-205. (PTR-4). $1.80(ph OTS); $1.80(mf OTS).

In order to determine the cause of a power change in the MTR on raising the inlet water temperature, calculations were of the reactivity change that would be associated with the resultant Xe buildup. (B.J.H.)

10952 KAPL-M-DBV-4
[Knolls Atomic Power Lab., Schenectady, N. Y.]
DETERMINATION OF THE NATURAL FREQUENCIES OF VIBRATION IN THE BREEZE BELLOWS. Second Phase. D. B. Vail. Mar. 4, 1954. 44p. Contract W-31-109-Eng-52. $7.80(ph OTS); $3.30(mf OTS).

It was observed that the fundamental transverse and longitudinal resonant frequencies were appreciable higher at the compressed length of the bellows but that resonance could occur at less than the 32 cps requirement cited in the SIR Mark B valve specifications. An additional mode of vibration was observed, but this rocking mode occurred at a frequency above 32 cps. At the compressed length of the bellows, the spring gradient was non-linear which caused the vibrational characteristics of the bellows to be similar to those observed with "hard" springs. The water filled bellows were observed to have slightly lower resonant frequencies. The water also damped the displacement at resonance to a slight degree. It was demonstrated that the transverse resonant frequency was appreciably increased by the addition of transverse restraint. The longitudinal resonant frequency was also increased by adding longitudinal restraint. (auth)

10953 KAPL-M-EBJ-3
Knolls Atomic Power Lab., Schenectady, N. Y.
REINFORCING RING FOR OPENINGS IN PRESSURE VESSEL. E. B. Johansson. Nov. 16, 1955. 26p. Contract W-31-109-Eng-52. $4.80(ph OTS); $2.70(mf OTS).

The feasibility of reducing the stress concentration factor near pressure vessel openings to allowable values through the addition of material near the opening was considered. The addition of bending stresses by the reinforcement material allows only approximate calculations, however, the method of calculation and graphical results are given. (D.E.B.)

10954 KAPL-M-EGB-21
Knolls Atomic Power Lab., Schenectady, N. Y.
PRELIMINARY EXPERIMENTS ON THE NITRIDING OF REACTOR MATERIALS IN SODIUM. E. G. Brush and C. R. Rodd. Sept. 22, 1955. 9p. Contract W-31-109-Eng-52. $1.80(ph OTS); $1.80(mf OTS).

The use of N_2 as a cover gas in the SIR Mark B primary coolant system poses the problem of possible nitriding to reactor structural materials. Preliminary tests have been conducted at KAPL and in the MTR in sodium under a pressurized N_2 blanket. Results show that at 900 and 1100°F the ferrous alloys and Be readily nitride under these test conditions. The thermodynamics of the reaction indicate that transport of N_2 in Na (diffusion, entrainment, or Ca_3N_2 as a carrier) may be the rate controlling factor. Further experiments must therefore be performed to evaluate the problem under conditions more closely resembling those of actual reactor operation. (auth)

10955 KAPL-M-ELW-4
Knolls Atomic Power Lab., Schenectady, N. Y.
NOTES ON A STREAMING PROBLEM. E. L. Wachspress. Apr. 8, 1954. 14p. Contract W-31-109-Eng-52. $3.30 (ph OTS); $2.40(mf OTS).

Assuming isotropic scattering and steady-state conditions, the neutron leakage from the ends of a cylindrical hole is calculated. (D.E.B.)

10956 KAPL-M-FCS-3
Knolls Atomic Power Lab., Schenectady, N. Y.
NATURAL CONVECTION IN SODIUM IN AN 8" HORIZONTAL PIPE. F. C. Steiner. Dec. 6, 1954. 22p. Contract W-31-109-Eng-52. $4.80(ph OTS); $2.70(mf OTS).

In connection with the problem of thawing out the reactor by the application of heat on the sodium piping, it was established that melting in a horizontal pipe is accomplished with the aid of free convection. Data were obtained regarding the rate of heat transfer by convection as a function of the temperature difference between the top and bottom of the horizontal pipe. Steady-state heat transfer and heat loss data were obtained using a water-cooled heat exchanger. It was established that complete melting of a 10 foot long, 8" pipe section containing about 230 lbs of sodium can be accomplished in 50 minutes when using 14 KW of external heat applied in a 14" length at one extreme end of the piping system. (auth)

10957 KAPL-M-FEC-3
[Knolls Atomic Power Lab., Schenectady, N. Y.]
CALCULATIONS OF REQUIRED SPEEDS OF CONTROL AND SAFETY RODS. F. E. Crever and J. H. Pigott. Apr. 2, 1948. Decl. Feb. 8, 1956. 28p. Contract W-31-109-eng-52. $4.80(ph OTS); $2.70(mf OTS).

Calculations were made to determine the safe rate of reactivity increase and the desired safety rod tripping times and acceleration of the Schenectady reactor. The reactor is assumed to have a delayed neutron fraction of 0.0073 using U^{235} fuel and a generation time of 10^{-6} sec. Complete results are given in both tabular and graphical form. (B.J.H.)

10958 KAPL-M-FNS-6
Knolls Atomic Power Lab., Schenectady, N. Y.
USE OF A D-C ELECTROMAGNETIC PUMP AS A

THROTTLING DEVICE IN A SODIUM SYSTEM. F. N. Schell. Aug. 13, 1953. 11p. Contract W-31-109-Eng-52. $3.30(ph OTS); $2.40(mf OTS).

Operation of a d-c pump as a dynamic brake (magnetic drag) in a Na system proved successful. The Na flow from the 60 gpm test pump was reduced by 26 percent and the pressure at the inlet of the test pump was lowered from 15 psia to 2.7 psia. A comparison between the performance of the d-c unit as a pump and as a generator is presented. (auth)

10959 KAPL-M-GD-5
Knolls Atomic Power Lab., Schenectady, N. Y.
PROMPT AND DELAYED POWER CHANGES RESULTING FROM A REACTIVITY VARIATION. G. Dessauer. Sept. 23, 1949. Decl. Feb. 7, 1956. 7p. Contract W-31-109-Eng-52. $1.80(ph OTS); $1.80(mf OTS).

10960 KAPL-M-HFK-3
Knolls Atomic Power Lab., Schenectady, N. Y.
HYDROGENOUS LOOP: WATER INJECTION TEST SDT-3 [on] RUN NO. W.I.-1. H. F. Karnes. Sept. 12, 1955. 15p. Contract W-31-109-Eng-52. $3.30(ph OTS); $2.40(mf OTS).

Six grams of H_2O were injected into the 1-inch hydrogenous loop at a temperature of 500°F. The pressure rise within the loop was more than 17 psi for at least $^3/_4$ second and then decreased to 7.5 psi. Approximately 10% of the injected hydrogen was collected as gas in the surge tank. The balance is assumed to be in the form of NaOH and NaH. The plugging temperature of the Na increased from less than 300°F to 630°F after injection. Although the loop temperature was approximately 500°F, no flow restrictions were noted in the circulating system until flow was diverted to the plugging section. Cold trapping was successful in reducing the saturation temperature to 310°F. Hydrogen analysis of the Na confirmed the relative changes in plugging temperatures. (auth)

10961 KAPL-M-JBS-4
Knolls Atomic Power Lab., Schenectady, N. Y.
ESCAPE OF RADIATION FROM BLANKET. John B. Sampson. Aug. 13, 1948. Decl. Feb. 8, 1956. 9p. Contract W-31-109-Eng-52. $1.80(ph OTS); $1.80(mf OTS).

Estimates are reported on the escape of radiation from a reactor with a Be–U blanket of 10-in. thickness operating at 10 Mw. Spherical geometry with outside radius of the blanket 21.6 in. is assumed. Data for the sides are for full blanket density and for the ends are for a reduced density of $^2/_3$ full density. (F.S.)

10962 KAPL-M-JHP-4
Knolls Atomic Power Lab., Schenectady, N. Y.
EFFECT OF FUEL ROD LENGTH ON DIMENSIONS OF REACTOR SERVICING MECHANISMS. John H. Payne, Jr., and Charles S. Hofmann. June 13, 1949. Decl. Feb. 8, 1956. 16p. Contract W-31-109-eng-52. $4.80(ph OTS); $2.70(mf OTS).

A qualitative study was made of the effects of various fuel rod lengths on the reactor servicing mechanisms and associated equipment. Equations involving dimensions of the servicing mechanism are set up. (F.S.)

10963 KAPL-M-JJB-2
Knolls Atomic Power Lab., Schenectady, N. Y.
SUMMARY OF MULTIGROUP EQUATIONS FOR BARE CUBICAL REACTORS. J. J. Bulmer and R. Siegel. Aug. 30, 1955. 10p. Contract W-31-109-Eng-52. $1.80(ph OTS); $1.80(mf OTS).

10964 KAPL-M-MSN-2
Knolls Atomic Power Lab., Schenectady, N. Y.
NEUTRON THERMALIZATION BY A HEAVY GASEOUS MODERATOR. Mark S. Nelkin. July 28, 1955. 10p. Contract W-31-109-Eng-52. $3.30(ph OTS); $2.40(mf OTS).

10965 KAPL-M-SMS-5
Knolls Atomic Power Lab., Schenectady, N. Y.
VALVE OPERATING SYSTEM. E. R. Hottenstein. May 11, 1955. 31p. Project SAR. Contract W-31-109-Eng-52. $9.30(ph OTS); $3.60(mf OTS).

A comparison is made of seven valve operating systems utilizing hydraulic piston operated valves for use in the SAR. The system supplies the necessary pressure and flow to actuate the hydraulic valves in the primary coolant and auxiliary systems. (F.S.)

10966 KAPL-M-SMS-12
Knolls Atomic Power Lab., Schenectady, N. Y.
EMERGENCY COOLING TEST PROGRAM. A. J. Arker and D. E. Davidson. Dec. 6, 1955. 20p. Contract W-31-109-Eng-52. $3.30(ph OTS); $2.40(mf OTS).

A program is outlined for the testing of submarine reactor emergency cooling systems. The test program includes studies of flow coast down conditions, pressure drop-flow relationships of various components at low flow rates, and the nature of the flow in the main coolant piping. (B.J.H.)

10967 KAPL-M-WEC-2
Knolls Atomic Power Lab., Schenectady, N. Y.
DESIGN STRESS ANALYSIS, SIR [MARK B] CONTAINER ASSEMBLY. W. E. Cooper. Dec. 31, 1953. 148p. Contract W-31-109-Eng-52. $24.30(ph OTS); $7.50(mf OTS).

The work which has been done on the design stress analysis of the major components of the SIR (Mark B) container assembly is reviewed. (B.J.H.)

10968 KAPL-M-WEC-7(Rev. 1)
Knolls Atomic Power Lab., Schenectady, N. Y.
STRUCTURAL DESIGN BASIS, SAR REACTOR COMPONENTS. W. E. Cooper. June 20, 1955. Revised Nov. 15, 1955. 33p. Contract W-31-109-Eng-52. $6.30(ph OTS); $3.00(mf OTS).

A structural design basis to provide limitations upon stresses and deformations and to outline the general design requirements for the SAR is given. (F.S.)

10969 M-4415
Massachusetts Inst. of Tech., Cambridge.
Servomechanisms Lab. and Jackson and Moreland (Engineers), New York.
MANUAL OF INSTRUMENTS AND CONTROLS FOR THE BROOKHAVEN NUCLEAR REACTOR. BOOK 3, VOL. I. May 1949. Decl. Jan 13, 1956. 165p. $1.00(OTS).

This book is one of a series written for Brookhaven National Lab., prepared under contract to H. K. Ferguson Co.

Control-rod drives and rod-position instrumentation are described in detail. (T.R.H.)

10970 MonN-232(Rev.)
[Clinton Labs., Oak Ridge, Tenn.]
OPERATING CHARACTERISTICS OF MAIN CIRCULATING SYSTEM—THE DANIELS EXPERIMENTAL POWER PILE, DESIGN I. N. J. Palladino. Dec. 27, 1946. Revised Feb. 19, 1947. Decl. Jan. 27, 1956. 29p. Contract W-35-058-eng-71. $4.80(ph OTS); $2.70(mf OTS).

The operating characteristics of the main He circulation system of the Daniels Pile, Design I, under various loads and with various He pressures is presented. The relation between pressure drop through the pile and the pile heat output for various operating pressures is shown. The relation between total pressure drop through the system and pile heat output for operation with two boilers and four blowers, one boiler and two blowers, and one boiler and one

blower respectively is shown. The calculated system pressure drop based on the tentative arrangement indicates that the compression capacity being used for blower specifications is high enough to afford sufficient margin for uncertainties in duct lengths, valving and general arrangement. Curves are presented showing blower speed and horsepower as a function of pile heat output for various system pressures and boiler and blower combinations. For operation at 40,000 KW of pile heat output, it is necessary to use two boilers and four blowers and a system pressure of 10 atmospheres. For operation of the pile at 4000 KW heat output the system pressure must be at least 1.2 atmospheres for operation with two boilers and four blowers and 1.8 atmospheres for one boiler and two blowers. For operation with one boiler and one blower the operating pressure must be at least 3 atmospheres. (auth)

10971 NAA-SR-Memo-85
North American Aviation, Inc., [Downey, Calif.]
THE EFFECT OF FISSION FRAGMENT POISONS ON THE BREEDING GAIN FOR HTR. Ralph Balent. Aug. 22, 1951. Decl. Apr. 11, 1956. 5p. $1.80(ph OTS); $1.80 (mf OTS).

10972 NAA-SR-Memo-339
North American Aviation, Inc., [Downey, Calif.]
PHYSICS OF THE CONVERTER REACTOR BLANKETS. W. J. Houghton. June 10, 1952. Decl. Jan. 11, 1956. 31p. Charge $6.30(ph OTS); $3.00(mf OTS).

10973 NAA-SR-Memo-355
North American Aviation, Inc., [Downey, Calif.]
SHIELDING FOR THE CONVERTER REACTOR. W. C. Cooley. June 13, 1952. Decl. Jan. 11, 1953. 9p. Charge $1.80(ph OTS); $1.80(mf OTS).

First approximations are made of the γ and neutron shielding requirements for the Converter Reactor based on the design with the canal over the reactor, and operating at 310 megawatt power. It is concluded that 11 ft of water plus a bottom plug containing 10.5 in. of Pb between two 5 in. steel layers will provide adequate shielding for the sub-pile room. The depth of water in the canal should be approximately 20 ft. A total depth of water above the core of 30 ft is more than adequate. The shielding required around the sides of the reactor tank may be accomplished by concrete and/or earth, if an adequate thermal shield (two 3 in. steel layers) is provided to avoid excessive thermal stresses in the concrete or too high temperatures in the earth. The shield thicknesses calculated herein are conservative in that plane geometry has been assumed and the $1/r^2$ decrease of flux with distance from the core has been neglected. (auth)

10974 ORNL-1583
Oak Ridge National Lab., Tenn.
DEVELOPMENT OF HYDROGEN–OXYGEN RECOMBINERS. Progress Report. Reactor Experimental Engineering Div. J. A. Ransohoff and Irving Spiewak. Oct. 22, 1953. Decl. Dec. 3, 1955. 77p. Contract W-7405-eng-26. $0.45(OTS).

Testing of flame and catalytic recombiners on the HRE including a description of the off-gas system is reported. Preliminary testing of the recombiners, the performance of the recombiners under operating conditions, and the reliability of the gas production estimates are discussed. A discussion of the catalytic reaction of $2H_2 + O_2$ on platinized alumina includes a study of the effect of O_2 concentration, temperature from 230 to 520°C, pressure from 25 to 110 psia, and space velocity from 725,000 to 1,850,000 hr^{-1}. Also, a comparison of the recombination rates of H_2 and D_2 under comparable conditions is made. The reaction controlling mechanism is stated to be diffusion of gas to the catalyst surface, and the basis for this conclusion is developed. The advantages, possible uses, and operating characteristics of a new-type explosion-proof, automatic-load-adjusting flame combiner are described. It is particularly adaptable to reactors where the gases evolved are associated with large quantities of steam such as in a boiling reactor. A general description, operation, and calibration of a catalytic-combustion, H_2-gas analyzer are given. The derivation of the equation relating recombination efficiency to H_2-O_2 ratio and the method for the theoretical calculation of recombination with diffusion controlling are presented. (J.E.D.)

10975 WAPD-RM-186
Westinghouse Electric Corp. Atomic Power Div., Pittsburgh.
CYLINDRICAL REACTOR WITH SOURCE. H. L. Garabedian. May 1953. Decl. Apr. 17, 1956. 49p. Contract AT-11-1-gen-14. $0.35(OTS).

A description is given of the kinetics of a homogeneous cylindrical reactor with a point source of fast neutrons located at an arbitrary interior point on the axis of the reactor. The theory developed is quite general, at least to the extent that five delayed neutron groups are taken into consideration and appropriate ages are assigned the source neutrons, the prompt fission neutrons, and each of the five groups of delayed fission neutrons. Application is made to the determination of the power level in the spare plate critical assembly. (auth)

Refer also to abstract 10823.

NUCLEAR TRANSFORMATION

10976 IDO-16269
Phillips Petroleum Co. Atomic Energy Div., Idaho Falls, Idaho.
ENERGY DEPENDENCY OF η FOR U^{235} IN THE REGION 0.04 – 1.0 EV. J. R. Smith and E. H. Magleby. Nov. 21, 1955. 7p. Contract AT(10-1)-205. (PTR-19). $1.80(ph OTS); $1.80(mf OTS).

Measurements have been made of the energy dependence of η, the number of fission neutrons emitted per neutron absorbed, for U^{235} in the energy region 0.04 to 1.0 ev. Two 5-in. Hornyak buttons on DuMont 6364 photomultiplier tubes count fission neutrons from a target of U^{235} placed between them in the Bragg beam of the MTR crystal spectrometer. A sample changer moves the target into and out of the beam, enabling a single thin BF_3 counter behind the target to serve as both flux monitor and transmission detector. The data are normalized to the Brookhaven slow chopper results, which were normalized to the thermal value of η = 2.08. Below 0.1 ev η is essentially flat. Above 0.1 ev it falls to a value of 1.95 for the 0.3 ev resonance, then rises to a peak of about 2.2 between 0.5 and 1.0 ev. In the neighborhood of 1 ev η decreases as the 1.12 ev resonance is approached. (auth)

PARTICLE ACCELERATORS

10977 CF-53-6-224
Oak Ridge National Lab., Y-12 Area, Tenn.
360° CYCLOTRON. John S. Luce. June 22, 1953. 11p. Contract W-7405-eng-26. $3.30(ph); $2.40(mf OTS).

This study considers the utilization of the 360° focusing principle in a cyclotron. Ions accelerated from a point through a uniform magnetic field will all return, at the same time, to this point if allowed to pass through 360° regardless of their angle of emergence. If the ions are then accelerated each time they pass this point, they will travel

in ever larger circles. This principle differs from other cyclotrons which accelerate particles every 180°, causing the ions to travel in spirals instead of circles. Some methods of using 360° focusing in a cyclotron are presented, in addition to expected differences in performance. (auth)

10978 CF-54-2-92
Oak Ridge National Lab., Tenn.
AN RF SYSTEM FOR A VARIABLE ENERGY CYCLOTRON. N. F. Ziegler. Mar. 1, 1954. 21p. Contract [W-7405-eng-26]. $4.80(ph OTS); $2.70(mf OTS).

The work completed on an oscillator circuit applicable to a variable energy cyclotron containing as few frequency-selective elements as possible and having a frequency range from 5 to 12 megacycles per second is described. A push-pull oscillator directly connected to the resonant system was investigated. This is a "tuned-plate, tuned-grid" circuit having only 2 elements to be varied when changing frequency. The correct feedback is easily obtained and can be varied over a wide range. (F.S.)

10979 CF-55-8-73
Oak Ridge National Lab., Tenn.
ELECTRICAL MEASUREMENTS ON A MULTIPLE-PARTICLE CYCLOTRON MODEL. N. F. Ziegler. [August 1955]. 28p. Contract W-7405-eng-26. $4.80(ph OTS); $2.70(mf OTS).

A frequency range of 5.9 to 8.7 Mc has been obtained in a model cyclotron dee stem system by variation of large parallel plate capacitors connected between the dee stems and dee stem housing. The effect of these capacitors upon the characteristics of the system is included in this report. (auth)

10980 LWS-24220
California Research and Development Co., Livermore, Calif.
FIRST COLLISION SOURCE INFINITE REFLECTOR STUDY. Karl Bernstein and Richard H. Graham. Mar. 3, 1952. Decl. Apr. 13, 1956. 10p. (CRD-T4A-90). $1.80 (ph OTS); $1.80(mf OTS).

The performance of several reflector materials has been studied using a first collision neutron source and two-energy-group neutron diffusion theory. The study included the numerical evaluation of the albedo and absorption for fast and thermal neutrons incident on various reflector materials. The results are tabulated and shown pictorially. It should be noted that the solution presented is for an infinitely thick slab of reflector material, although this can be approximated closely by a comparatively thin reflector slab. The study is necessary to, and preliminary for, a forthcoming study in which the over-all neutron economy will be evaluated when portions of lattice are replaced by reflector material to simplify mechanical design and operation. (auth)

10981 UCRL-1394
California. Univ., Berkeley. Radiation Lab.
SPACE CHARGE EXPANSION OF ION BUNCHES DRIFTING DOWN A CONDUCTING PIPE. A. Garren. July 13, 1951. Decl. Feb. 20, 1956. 15p. Contract W-7405-eng-48. $3.30(ph OTS); $2.40(mf OTS).

Calculations had been made on the longitudinal diffusion due to space charge of ion bunches during acceleration, for the particular case when bunches were to be accelerated down a pipe. The following calculation pertains to the expansion of originally cylindrical bunches under the influence of space charge forces as they drift down a pipe at constant velocity. Subject only to the non-critical assumption that the bunches retain a cylindrical shape and uniform density, and that the velocity of motion down the pipe is non-relativistic, exact equations of motion are derived. Tables have been prepared to facilitate the numerical evaluation of functions entering these equations for a considerable range in the arguments. For one particular case of interest this numerical evaluation is carried out completely and the equations of motion integrated by the Differential Analyzer. (auth)

10982 UCRL-2297
California. Univ., Berkeley. Radiation Lab.
SPIRAL BEAM ACCELERATOR MODEL RESULTS. Stirling A. Colgate and A. J. Schwemin. July 1953. Decl. Mar. 2, 1956. 27p. Contract W-7405-eng-48. $0.25 (OTS).

A model of the spiral beam accelerator or beam buncher has been made—full scale in dimensions but reduced in current and voltages. The basic result of the model was an accelerator with 60 ± 5 percent phase acceptance under conditions of central rod potential, angular momentum, and transit time factor considerably more modest than originally conceived. The bunching and beam stability were similarly favorable. (auth)

RADIATION EFFECTS

10983 CC-1925
Chicago. Univ., Metallurgical Lab.
THE BEHAVIOR OF SOME SOLID MATERIALS UNDER PILE OPERATING CONDITIONS. Milton Burton and Frederick Seitz. July 20, 1944. Decl. July 10, 1956. 11p. Contract [W-7401-eng-37]. (A-2811). $3.30(ph OTS); $2.40(mf OTS).

The present state of knowledge concerning the effect of pile radiation on a variety of solid materials is reviewed. Radiation corrosion will not be a serious hazard for Al or stainless steel but it can be for Fe or Pb if either are exposed to water. Apart from corrosion the principal uncertainty is in regard to the Wigner effect on the behavior of metals. The effects on Al or a bonding material while less severe must also be considered serious. The expectation in regard to graphite is that its behavior will not cause trouble during the first 100 days of operation although serious troubles will probably arise within two years of operation. Organic materials can be used safely only in regions of limited exposure. (auth)

10984 CF-52-11-240
Oak Ridge National Lab., Tenn.
SAMPLE HOLDER FOR IRRADIATION TEST ON Th–U ALLOY FUEL PLATE. F. C. Zapp. Nov. 4, 1952. Decl. Feb. 9, 1956. 7p. Contract [W-7405-eng-26]. $1.80(ph OTS); $1.80(mf OTS).

A design is presented of a sample holder for irradiation tests on Th–U alloy fuel plates. Suggestions for machining and installation are included. (W.L.H.)

10985 CF-55-3-70
Oak Ridge National Lab., Tenn.
ON THE EFFECT OF REACTOR EXPOSURE ON THE RATE OF OXIDATION OF COPPER SINGLE CRYSTALS. F. W. Young, Jr. Mar. 9, 1955. 10p. Contract W-7405-eng-26. $1.80(ph OTS); $1.80(mf OTS).

The results of a preliminary study of the effect of reactor exposure on the rate of oxidation of Cu single crystals in pure O_2 are discussed. The method for preparation of the Cu is presented in detail. (W.L.H.)

10986 HW-29007
[Hanford Atomic Products Operation, Richland, Wash.]
STABILITY OF FLUOROTHENE UNDER EXPOSURE TO GAMMA RADIATION. K. L. Adler. Aug. 11, 1953. Changed from OFFICIAL USE ONLY July 6, 1956. 4p.

Contract [W-31-109-eng-52]. $1.80(ph OTS); $1.80 (mf OTS).

Results of a study on the stability of fluorothene (polytrifluorochloroethylene, Kel-F) to γ radiation, which was investigated to estimate the probable life expectancy of fluorothene equipment exposed to Purex process solutions, are reported. (F.S.)

10987 NAA-SR-Memo-22
North American Aviation, Inc., Downey, Calif.
AN EXPERIMENT PROPOSED FOR THE NAA STATITRON I. Ag SELF DIFFUSION IN A RADIATION FIELD. G. J. Dienes and M. H. Feldman. Mar. 15, 1951. Decl. Apr. 13, 1956. 15p. Contract AT-11-1-gen-8. $3.30(ph OTS); $2.40(mf OTS).

A brief outline of the type of changes in diffusion constant-temperature characteristics which may occur due to the presence of a radiation field and a brief description of some possible experimental procedures and difficulties and possible methods for minimizing these experimental difficulties in studying Ag self diffusion in the radiation field of a Van de Graaff generator, are given. (F.S.)

SHIELDING

10988 CF-51-10-106
Oak Ridge National Lab., Tenn.
SHIELDING CALCULATIONS FOR RADIOACTIVE LIQUID SAMPLERS. A. F. Arruzza. Oct. 15, 1951. Decl. Feb. 7, 1956. 15p. Contract [W-7405-eng-26]. $3.30(ph OTS); $2.40(mf OTS).

Curves showing thickness of lead vs sample distance were adopted to provide amply safe shielding for the samplers. One curve was made for high level intensity samples and one curve for medium level samples. Essentially all design thicknesses of the lead shielding for the samplers in the system submitted for fabrication were extracted from the curves. (auth)

10989 CF-53-11-64
Oak Ridge National Lab., Tenn.
NOTES ON THE CALCULATION OF THE ATTENUATION OF NEUTRONS THROUGH THICK SHIELDS. F. H. Murray. Nov. 30, 1953. 40p. Contract W-7405-eng-26. $6.30(ph OTS); $3.00(mf OTS).

An approximate method of calculating the neutron flux at a large distance from a point or plane source of fast neutrons is described. Tables for calculations with the continuous theory are appended. (D.E.B.)

10990 KAPL-M-DGC-23
Knolls Atomic Power Lab., Schenectady, N. Y.
PERMISSIBLE SHIELD VOIDS IN OFF-HULL SERVICING EQUIPMENT. D. G. Chappell. [Dec. 30, 1955]. 18p. Contract W-31-109-Eng-52. $3.30(ph OTS); $2.40(mf OTS).

Permissible voids and flaws in off-hull servicing equipment shielding is presented as a function of source photon energy and shield thickness. Maximum grid spacing for surface testing is presented. The data presented are based on 10% local variation in dose rate but can easily be modified for other close tolerances. (auth)

10991 TID-5018
Nuclear Development Associates, Inc., White Plains, N. Y. and Oak Ridge National Lab., Tenn.
A CRITERION FOR THE EXPERIMENTAL OPTIMIZATION OF TWO-COMPONENT UNIT SHIELDS. Herbert Goldstein and E. P. Blizard. May 10, 1951. Decl. Jan. 12, 1956. 6p. $1.80(ph OTS); $1.80(mf OTS).

The difficulties and artificiality of calculating from an assumed radiation-nucleus interaction model the optimum distribution of shield component materials has led the authors to derive a criterion for determining experimentally the distribution for a two-component unit shield having the least weight for a given attenuation. In this derivation no assumption is made about the nature of the neutron and γ processes involved in the shield. The extremum conditions are related in simple fashion to a function determined by measuring the effects on surface radiation dose of local changes in volume concentration and radius of the shield. (G.Y.)

URANIUM AND URANIUM COMPOUNDS

10992 A-3247
Columbia Univ., New York. Pupin Physics Labs.
URANIUM ISOTOPIC DETERMINATION BY α-MEASUREMENT. M. L. Bellow and R. I. Klebanow. Mar. 30, 1946. Decl. Jan. 17, 1956. 13p. (DR-693). $3.30(ph OTS); $2.40(mf OTS).

Several methods for determining the isotopic concentration of U samples have been developed; among them, fission counting, mass spectrometer analysis, and α counting. Detailed procedures are given for the techniques employed. (W.L.H.)

10993 ANL-5019
Argonne National Lab., Lemont, Ill.
THE MELTING OF HIGH PURITY URANIUM. B. Blumenthal. Nov. 14, 1952. Decl. Dec. 9, 1955. 56p. Contract W-31-109-Eng-38. $0.40(OTS).

A melting process was developed for the consolidation of high-purity, electrolytic U crystals into sound ingots of high density without serious contamination. The metal is estimated to be better than 99.993 wt. % pure and is metallographically reasonably free from impurities. (auth)

10994 HW-37766
Hanford Atomic Products Operation, Richland, Wash.
RESONANCE CAPTURE OF NEUTRONS BY URANIUM CYLINDERS. M. V. Davis. Aug. 18, 1955. Decl. Jan. 7, 1956. 56p. Contract W-31-109-eng-52. $0.35(OTS).

The dependence of the resonance integral for U^{238} upon geometry and U temperature has been determined through danger coefficient measurements performed in the Hanford Test Pile. The geometry dependence was investigated using U cylinders of ranging diameters in the form of solid elements and shells. The temperature dependence (Doppler broadening) was studied by heating U elements and permitting them to cool while observing the change in pile reactivity. Some interpretation of results is also presented. (auth)

Refer also to abstract 10915.